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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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In building the Indianapolis Southern Railroad, which is described on another page of this issue, an interesting feature was the effort of the engineers to provide a grade condition that would offer no train resistance at any point in excess of what would be encountered by a train on the maximum grade on a tangent. To do this, all curves were compensated at the rate of .04 per cent. per degree of curvature when the length of the curve was equivalent to the full length of a maximum train, and at .03 per cent. where the curve was one-half the maximum train length, or less. At all stations, passing tracks, water or coaling stations, railroad crossings, or other points where it was contemplated that trains carrying full tonnage would have to make stops, a reduction of one-tenth of 1 per cent. in gradient was made; that is, one-half of 1 per cent. grades were reduced to four-tenths, for example. Also an effort was made to obviate the cumulative adverse effects of any excessively long maximum grades. It is generally known, of course, that where an opposing maximum grade is unusually long—several miles, say—even though it be properly compensated for curvature the tonnage rating of locomotives must be reduced below that which they are quite able to take up a maximum grade of ordinary length. The approaches to Bloomington plateau on the Indianapolis Southern required long stretches of maximum grade. As stated in the article, the heaviest tonnage is toward Indianapolis on account of the coal traffic. As originally located, the westerly approach to the plateau mentioned was a continuous ascent of the maximum northbound grade—one-half of 1 per cent. To avoid this, a new location was made at considerable expense to enable the introduction of two relief grades, the presence of which is to afford opportunity to engines in continuous motion to recover their normal steam pressure, and also to lighten the grades for trains pulling into and out of passing tracks at these points. The reduction of one-tenth of 1 per cent. in gradient at stations, passing tracks, etc., was not arrived at by theoretical determinations of what was required; but having recognized the advisability of providing help at such points, the amount of same was based on what was assumed from experience would probably be correct, influenced by the extra cost of including it in the work; for in many cases a greater reduction than the above, even though it might have been desirable, would have added excessively to the cost. The features mentioned which have been embodied in the construction of this line to equalize its adverse characteristics, so to speak, and thereby reduce the maximum train resistance to an equivalent of that offered by the maximum tangent gradient, make it unique in this respect, and the operating results will be watched with interest.

The New York Central has decided to make the block signals on its passenger tracks "semi-automatic" throughout the whole of the main line from Albany to Buffalo, 300 miles; and also throughout the Hudson division (Albany southward to the Electric division). Here there are no separate main tracks for freight trains.* Each block section will have a track circuit (or successive circuits) the whole of its length, so that collisions due to the parting of trains will be guarded against, and permissive blocking will be as safe as under automatic signals. The improvement will make the New York Central main line passenger tracks the most thoroughly signaled railroad in the world, for no such combination of operator-control and track-circuit control has been installed anywhere else, except for very short distances. The block sections on the New York Central are two and three miles long, so that, with the track circuits made 3,500 ft., there will have to be three or four or more circuits in each block in most cases. Outlying switches, where not interlocked, will have the protection of switch indicators, as is common in simple automatic signaling. At present such switches are controlled from the towers, but by the use of time-releases, where necessary, there would seem to be no reason why the indicators alone should not afford all reasonable protection. This use, on a busy railroad, of track circuits which from the engineman's standpoint are two or three miles long, will give new force to the question whether a track-controlled signal remaining in the stop position should be understood as limiting the speed of trains to a rate low enough to avoid danger from a possible broken rail. We notice that Mr. W. H. Elliott, in a paper read this week before the New England Railroad Club, takes the stand that the speed should be thus limited. On straight lines this must impose some

*On the freight tracks between Albany and Buffalo automatic signals have been installed at a number of places intermediate between the manual signals. This course has been found necessary because of the large number of freight trains run and the necessity of giving permissive signals unless the block sections are shortened. It is probable that this improvement will be continued on the freight tracks until they are equipped with track circuits throughout; and when that has been accomplished it is quite likely that the manual signaling on these tracks will be abolished, or, at any rate, that the control apparatus will be taken out.

unnecessary delays, unless failures of batteries, wires, etc., are made exceedingly rare. How strictly is this broken-rail speed enforced in actual practice? Some testimony on this point would be of decided interest, especially from enginemen who run fast trains at night on lines run by automatic signals. That the double control—man-control and machine-control—now to be used on the New York Central would definitely increase the safety of trains on many lines (we cannot apply this to the New York Central specifically for we do not know but its discipline may be far above the average) is strikingly indicated by a list of collisions on block signaled lines in the United States which is contained in the report recently made by Messrs. Adams and Anthony to the Interstate Commerce Commission. In this list all of the important collisions occurring in two years under the telegraph block system (13) were due to errors of signalmen, while all occurring under automatic block signals (7) were due to errors of enginemen.

NEW RAILROAD BUILDING.

The thirteenth regular Construction Record of the *Railroad Gazette* is published in this issue. This comprehensive list of railroad construction work projected, authorized or under way was compiled semi-annually from the spring of 1898 until March, 1902, when it was made an annual report. It is a record of railroad companies incorporated and railroads projected or building in the United States, Canada and Mexico, largely compiled from our regular construction columns and brought up to date wherever possible by later official reports.

Considering the United States as a whole, no new construction has within the past year been undertaken of anything like so great importance as the St. Paul's Pacific extension, the Western Pacific and the Denver, North-Western & Pacific, begun during the preceding two or three years. Since last year the route of the St. Paul's extension has been announced, which shows that it will be a sharp competitor of the Hill roads, particularly the Northern Pacific, along the Yellowstone river and in the Butte territory, which lends strength to the belief that the Harriman influence in the road is far stronger than disclosed in the Union Pacific's small investment in St. Paul stock. Work has been actively under way on the Western Pacific, which has over 100 miles of track laid, mostly on the eastern end. As on all other roads under construction during the year, progress has been greatly hampered by scarcity of labor, but there are now some 5,000 men at work on the line. Perhaps the most important other new line is the Portland & Seattle which before the end of the year will give the two Hill roads a splendid low grade line to the Harriman stronghold—Portland. Successful development of mining in Nevada accounts for the large amount of new construction in that state. The incentive for building may be judged from the record of the Tonopah & Goldfield, which, in its first year of operation, paid 17 per cent. on each class of stock and has begun payments at the rate of 20 per cent. for its second year.

Canada is particularly active in new railroad building. The lines of advance by the three dominating systems are in each case in similar directions: a through line from coast to coast as a backbone with branches connecting it with the principal traffic producing regions north or south. Actual construction work has been begun on the eastern section of the Grand Trunk Pacific, which the government is to build through rugged country at high cost. In Mexico the principal work under way is on the Southern Pacific's 775-mile extension south and east from the southern terminus of the Sonora Railway, of which 100 miles is now in operation and 300 miles more nearly finished.

The present prospect is that in the United States at least a much smaller proportion than usual of the new enterprises will be carried out this year. The following expressions of opinion, the first from the Chicago, Milwaukee & St. Paul in regard to the building of a proposed branch; the second from the recently issued annual report of the Pennsylvania Railroad summarize the situation.

"With the persistency with which state and national legislation is being sought for the purpose of decreasing earnings and increasing expenses of operation, there is not the slightest incentive for railroad companies to engage in any new enterprises, and much, if not all, the construction work now in progress would not have been under way if present conditions could have been forescen. . . . No such line will be be built this year, nor will the construction of this or any other new line be undertaken until there is a cessation of that hostile sentiment which seems determined to reduce to a minimum the value of present railroad securities and annihilate all demands for new ones."

"The prompt recognition of the growing needs of the country for improved railroad facilities has resulted in most of the necessary additions and improvements to your road having been made on most favorable terms. But the demands for increased capital from other railroads influenced by the same reasons, and substantially from all branches of industry, have made the present rates for money exceptionally high. This, together with the increased cost of labor and material, the legislation, both state and municipal, to increase taxes, reduce rates and fares and force upon the railroads large expenditures that yield no direct return, would seem to make it a wise policy on the part of your company to reduce its capital expenditures to a minimum, avoid new undertakings and restrict its expenditure for the present to such work as is now under way and must be completed."

With strong companies like the St. Paul and Pennsylvania face to face with such discouraging conditions, it is obvious that weaker companies are even less likely to be able to carry out new construction work. While the difficulty of obtaining money for new work will affect the undertakings of existing systems and of the larger new projects, it is not likely to prevent the construction of some of the smaller local roads in the West, Southwest and South, where, as a result of the continued prosperity of recent years, local interests have money ready at hand for investment. The serious aspect of the money stringency which the larger railroads have to face is, of course, the fact that greatly needed improvements to existing lines will have to be indefinitely postponed. Mr. Harriman has recently pointed out that the improvements and extensions which should normally have been each year were omitted during the six or eight years of the receivership and reorganization period following 1893. Then suddenly the country emerged from the years of depression into the greatest prosperity ever known and the railroads were obliged to crowd into the past few years all the work of providing new facilities which should have been done in the years preceding as well as that which normally belonged to those years. They have by no means yet caught up with the demands. Therefore, it will be a great hardship, both to the railroads and, in the end, to the country at large, to have these improvements postponed.

DEVELOPING AN IMPACT FORMULA BY EXPERIMENT.

At the 1906 convention of the American Railway Engineering and Maintenance of Way Association, in discussing the report of the Committee on Iron and Steel Structures, considerable attention was devoted to the formula for impact given in the report, which was declared to be unsatisfactory. The desirability of developing a satisfactory formula by a series of experiments caused the adoption of a motion that the committee be authorized to make the necessary experiments, the board of directors of the association being requested to provide the necessary funds in such manner as it deemed advisable. President Kelley, of the association, in a recent letter to members, suggests that the railroad companies contribute the money for these experiments.

This project is one that ought to be encouraged not only by all of the members of the association, but by the railroads as a whole. When the state of knowledge of bridge design is considered, the general haziness of treatment of this particular, and most important, feature is surprising. It is not because of any lack of appreciation of its importance on the part of engineers, however, for a great deal has been written on the subject and a good many experiments made. But the difficulties in the way of determining the effect of impact are manifold. Attempts at such determination have already been made with various instruments, some of them measurably successful, most of them failures, all containing some defect fatal to complete success and the solution of the problem. The cost of special trains, of adequate arrangements, and of the numerous assistants necessary, is great, and this no doubt has been the chief deterring factor with individual engineers or railroad companies in undertaking tests in a way which might be expected to yield correct results. Such tests as have been recorded show some surprising results; in the last analysis, however, little that is final or convincing can be deduced from them.

While the question is a mooted one among engineers, the difficulties in the way of its solution are, of course, most apparent to those who have made attempts to solve it. It is evident to all who have given any attention to the subject that the effect of impact may easily amount to quite as much as the static effect of the weight of the rolling loads on track, while on the other hand it may be considerably less. The fact that the effect of so considerable a proportion of the load should be, at this late date, so purely a matter of guess work, of empiricism, is amazing.

The value to all the railroads of the country of experiments which can be depended upon and from which can be deduced an impact formula or factor reasonably near the actual, will be enormous. Instead of an allowance by designers sufficient to cover the

unknown quantity, which allowance must of necessity be well on the safe side, a much more exact determination of stresses can be made. With so much of uncertainty out of the way, there is no doubt that economy will result; for providing for forces of unknown amount is not only difficult, but is apt to be wasteful. There is reason to believe that, as commonly designed, there may be a disproportion among members of a bridge. If some members are strong enough, others may be too heavy, or vice versa. Likewise, the effect of impact on track is apparent, but means of calculation are lacking. There is no doubt that track, as now made, is overloaded. How much, is a question which can only be answered by the aid of such tests as are proposed.

Not alone in designing new structures will the correct determination of an impact allowance be of value. Every railroad bridge engineer well knows the perplexing quality of the problem of determining just how far to go in allowing existing structures to carry loads in excess of those for which they were designed. Every operating officer will appreciate the expense which would be saved his company if the engineer could permit the heaviest power to run over all his track structures. It is evident, then, that if the engineer can eliminate this one, and in the majority of cases the greatest, element of uncertainty, he will be enabled to decide this question with much more assurance. The very fact that failures from overloading of bridges have been almost unheard of is evidence that provision for the unknown forces hitherto has been ample; and it is fair to conclude that a less provision might be made in many cases, with resultant economy.

When asked to appropriate funds for a purpose of this sort, railroad managers are apt to require some assurance that the work will be well done, and when done will be of value. The carrying on of a series of experiments of this sort is best done by a committee of an association such as the one proposing it. Composed mainly of engineers whose whole practice is in railroad problems, who are familiar with the conditions of railroad operation and are representative of all sections, any work of this character which they do is bound to be valuable. The committee to which it is proposed to entrust these experiments is by no means of one mind on the question of impact. This in itself is strongly indicative of the lack of precise knowledge of the subject and will, moreover, insure that any work done and any values deduced will not be laid before the association and the profession until they have been pretty thoroughly scrutinized. The presence on the committee of Professor Turneaure, of the University of Wisconsin, who has done more of this sort of work than any one else in the country, will go far to insure that thoroughly scientific methods will be employed.

It is stated by Mr. Kelley that during the past year a new recording extensometer has been devised which is free from many of the defects of earlier instruments. Those who have worked on the problem will appreciate the extent of the progress achieved by the construction of this apparatus when it is understood that it is practically free from instrumental vibration, and that deformation curves obtained from locomotives at high speeds are almost as smooth as those taken at lower speeds.

Knowing the things outlined above, the railroads of this country should feel that they can well afford to supply the funds to make these experiments, especially since, in comparison with the scientific importance of the subject and the economic results it is expected to yield, the cost will be extremely small.

MODERN METHODS OF RAILROAD BUILDING.

During the present generation, the methods of railroad location have undergone a complete change. This has been caused not so much by the increase of skill on the part of the engineer as by the improvements that have been made in the methods of construction and the realization on the part of promoters and builders of the intimate connection existing between the cost of that construction and the cost of operation. Early railroad location followed the lines of least constructional resistance, and apparently but little thought was paid to the extra cost of operation involved by heavy grades and sharp curves. Or, if these things were considered, an easy location was necessitated by the limited resources available for moving material. When the hand shovel and the cart were all that could be obtained, a deep cut, a high fill or a long overhaul were more serious objections to a low-grade line than they are in these days of the steam shovel and locomotive haulage. So location has progressed with the facilities available for construction, and work is undertaken to-day with a certainty of obtaining satisfactory returns that would have been out of the question a generation ago.

It is due to this progress that much of the relocation and straightening of old lines have been undertaken. Roads that were built in the days when every shovelful of earth to be moved had to be carefully considered, and upon which an enormous traffic has subsequently been developed, have found themselves hampered in operation by curves and grades which these new conditions required should be removed. On the other hand, new roads have been projected and built on a location and through a country that would have offered insuperable difficulties under the old regime.

Examples of these two conditions are becoming more and more frequent in this country, but perhaps there are none more pronounced than the two that are set forth in this issue. Starting in the low ground of eastern Virginia, the Norfolk & Western has wormed its way across the country to the mountains, and by climbing their summit and following the flow of the streams has reached the Ohio. Much of the work in the early days was tentative, with nothing in sight ahead but the local traffic of the towns it touched, so that no long extensions were made until the railroad was well into West Virginia and a western outlet became desirable. But the purity of the coal found in the region which it tapped doubled and trebled its traffic by leaps and bounds with the result that it was hampered and clogged by its own prosperity. The result of this has been the inauguration of a series of improvements extending over a number of years in which many miles of line have been rebuilt, and in which a great deal of curvature has been eliminated, accompanied, in some cases, by a notable reduction of grade. In this there has not been so great a reduction of distance as might have been expected from the amount of track that has been built, so that the remuneration for the investment will have to be found solely in the added speed of trains and the general lessening of the obstacles to transportation by which the capacity of the road can be increased. The increased traffic calls also for increased terminal facilities at division points where extensive yards are being built that involve the removal of large quantities of material on account of the natural topography of the ground where they are located. Hills have been leveled and valleys filled to such an extent that it is impossible to judge from the final appearance the amount of work that has been done. This is the example of the betterment of a road, otherwise in prime physical condition, that was built under the old regime but which demanded that these changes should be made so as to bring it up to modern standards and requirements.

In contrast with this condition and yet paralleling it in the results, we have the building of the Tidewater-Deepwater, which is a notable example of the modern spirit of location, that sets a grade and a rate of curvature in the quiet of the office; that makes a careful study of the country's topography before a party is put into the field; that works over the feasibility of the line in seclusion, and determines where it is worth while to make surveys; and, then, having settled these points, investigates and maps the country with a completeness that gives such a broad and comprehensive view of the situation that there is no gainsaying the contention that the best location the country affords has been secured. It is short, direct, and within the arbitrary limits of grade and curvature that have been set, and is a marked illustration of the value of extensive topographical work, so strongly urged by a book reviewed not long since. Such work costs more to prepare, and it is apt to cost more to execute than that where a single preliminary is run which is afterwards adopted for location. This is not a case of pig-headed persistence in a course that has been adopted simply because it has been adopted, but a cold-blooded calculation that the expenditure of so many dollars and cents will pay a certain definite interest on the investment. Where such work as this is done, the relation existing between the cost of building and the cost of operation is never lost sight of, and where a decrease of the one is possible, there is no hesitation about increasing the other.

Aside from the engineering features, the building of this new low-grade line from the West Virginia mountains to the sea offers a notable example of advanced railroad practice in that the line is built from a coal territory where few mines have been opened, with an absolute disregard of all local traffic, and with the courage of the conviction that when the facilities are offered the mines will be operated and the product offered for movement in quantities sufficient to warrant the outlay in the preparation.

In such work as that exemplified by the two roads under consideration we have, side by side, the spirit of the new railroad construction and that which has been born of the requirements of great traffic on a road built by a past generation. Of course such

work of improvement, and such construction would hardly be warranted where light trains and few of them were to be run. This will hold for many roads in remote communities where nothing but a light local traffic can ever be expected, but, as roads develop some such betterment as is outlined may be expected to come in for the old roads, while, for the new, the idea of coupling the estimates of future possibilities with present first cost and making the second dependent upon the first has become a well established economic principle.

RAILROAD TRACK SUPERSTRUCTURE.

In 1894 some experiments were conducted on railroad track, under the direction of the commanding officer of the Watertown Arsenal, to determine the actual stresses in rails under service conditions, and the results were contained in the annual report of the Chief of Ordnance for 1895. Dr. P. H. Dudley, connected with the New York Central Lines, has also made tests with an instrument called the "stremmatograph," which he devised, to show the depression of the track below the trackman's surface, and the stresses in the rails, and some of his results were presented to the International Railway Congress at Washington in 1905. But railroad literature dealing with the stresses in cross ties is scant. Mr. S. Whinery has made certain calculations, given in the November 4, 1904, issue of the *Railroad Gazette*, but it has remained for Mr. G. Cuënot, Chief Engineer Ponts et Chaussées, Service Ordinaire et Hydraulique du Département des Deux-Sèvres, and connected with the Board of Control of the Paris, Lyon & Méditerranée Railway to present the results of actual tests made to determine the strength of different kinds of cross ties, and at the same time deduce from them the proper length, in his opinion, to be given to cross ties, and the extent of the tamped bed under them to produce the best track.

The American Railway Engineering & Maintenance of Way Association has been considering, by committee, this very problem for the past two years, without very satisfactory results. The different opinions are usually based on the practice under which the individuals expressing them have grown up. Those who have been familiar with the use of 8½-ft. ties are opposed to diminishing the length, while on the contrary, those who have been using 8-ft. ties consider it unnecessary to make any change, and it is usually found that just as heavy equipment, and just as large axle loads are run over the one as the other. Therefore, when we saw Mr. Cuënot's book on the subject, it seemed to us that it had been published just at the right time. It matters not whether we agree with his views; there is, nevertheless, a lesson to be learned by the railroad engineers of the United States, in the manner of attacking a problem of this kind. All real knowledge comes from trained observation and experiment. Our railroad engineers have been usually too busy in the past to give the required attention to experimental work, but we think we notice a gradual progression in that line. The severe conditions of modern traffic require a very intelligent consideration of the foundations for supporting it, and some engineers have begun advocating an entirely new track substructure. Owing to the prevalent use of concrete, some of them propose that material, but it is a fact, up to the present time, that concrete has not proved to be a very suitable material for a cross tie.

Mr. O. E. Selby, Engineer of Bridges and Structures of the Cleveland, Cincinnati, Chicago & St. Louis, has made a beginning in the right direction in his "Study of the Stresses Existing in Track Superstructure and Rational Design Based Thereon," published in Bulletin No. 80 of the American Railway Engineering and Maintenance of Way Association, but so far it is theoretical only; it has not been backed up by a "figure or a number," determined by experiment, to quote Mr. Cuënot's own words. To illustrate: Mr. Selby has calculated the maximum fiber stress in rails for the usual span of ties. In the Ordnance Department report above referred to, Mr. Howard calculated the equivalent free span corresponding to the observed fiber stresses, and found "that the equivalent span has a value much lower than the distance from center to center of ties in some cases and a much greater value in others. The cases in which the equivalent span is greater than the distance from center to center of ties are the ones generally caused by the outside wheels of the locomotives, or wheels next a wide unloaded space on the rail," that is, the first pair of wheels of the pilot truck and the rear wheels of the tender. Taking a particular case, at 100-lb. rail, where the measured distance from center to center of ties was 26 in., the equivalent span for the first pilot wheel was 37.7 in., for the drivers 26.8 and 26.6 in., respectively; for the first three wheels of the tender each 19.0 in., and for the rear wheels 38.0 in.

Mr. Howard therefore concludes: "So different are the computed spans based on the measured strains from the spacing of the ties that it would evidently be impracticable to compute the fiber stresses in the rail from the data furnished by the dimensions of the rail, the spacing of the ties, and the load on the wheels, at least taking rails as they exist in ordinary track."

On account, therefore, of Mr. Cuënot's researches into the problem of the right length to be given to cross ties, and the proper extent of the tamped bed, together with the description of his apparatus for making the tests, we have arranged with him for the rights to introduce his book in English to our English speaking readers, and the entire work will appear in the columns of the *Railroad Gazette*.

Our readers will find the author's deductions on the proper length to be given to a cross tie rather hard to accept, as his views are so much at variance with accepted American practice, but it is hoped that the subject will be taken up experimentally by our American engineers in order to obtain data under the conditions existing in this country. American railroads have locomotives with axle loads of 61,600 lbs. against 40,000 lbs. in French practice.

Apart from the length of it, there seems to us to be considerable merit in the design of Mr. Michel's composite cross tie, which is described in this book, and it is commended to the serious attention of American railroad engineers for experimental purposes. Of course it is now rather expensive as compared with our wood cross ties, but it is not to be forgotten that their price is annually creeping upward. The question of the cross tie of the future is a very grave one for the railroads to solve, and, as a sign of its near approach, we find new designs and materials for ties being constantly introduced for experimental purposes. Mr. Cuënot, in his book, condemns the steel tie of inverted trough pattern, and experience with them in this country, both on the Pennsylvania and the New York Central, lead to the same conclusion. Not long ago a short trial of the trough pattern turned rightside up like a basin on the Pennsylvania Lines West led to its rejection, so that there does not seem to be any future at all for the trough pattern, unless indeed it is made much heavier than now, in which event it will be very costly.

The apparatus used by Mr. Cuënot for making his tests is quite simple, which ought to be an inducement to others to make similar studies. One of the novelties in connection with his work is the use of the camera to record the track depressions during the passage of a freight train. The results are illustrated in one of the plates. Besides his studies on the proper length to be given to cross ties, as outlined above, Mr. Cuënot has furnished other interesting and valuable information. His information with reference to the amount of creosoting to be given to different species of woods is valuable to our engineers on account of their increased attention to the subject during the last few years. Practical experience gained by others is always valuable, and saves us to a certain extent from going over explored ground, which has been found valueless.

In connection with this topic, his information on the seasoning of timber is of interest and value. The use of treenails in connection with wood cross ties, to repair holes which have become worn by the action of the fastenings, has been somewhat advocated in this country, on account of their considerable use in France, and it is therefore profitable to learn intimately about their use, instead of having a vague idea. Mr. Cuënot tells us of some points in connection with their employment, especially in the case of the wooden ones of the Collet system, which the railroad men might otherwise have been a long time in finding out from their own experience, for, unfortunately, it takes a long time to carry on an experiment in almost everything connected with railroad work.

There is one practice which seems, from Mr. Cuënot's work, to be common in France, which will hardly be accepted by American engineers, viz., that of placing hoop iron shims between the splice bars and the rails to bring them to a more even bearing. It is not clear to us how they can be made to stay in place, so as to be effective. It is possible he only used these in his experimental work, but his language leads us to infer that it is common practice. There is hardly any doubt that the use of screw spikes in this country is going to grow, probably in the near future. There is demand for a better track superstructure, and one that is more stable in its position on the roadbed, so as to reduce the maintenance cost. Those roads especially which are making extensive use of preserved woods for cross ties will find it absolutely neces-

sary to use screw fastenings, or else they will not reap the full benefit from the preservative treatment. They will lose money on the investment, for the ties will be spike killed before they are decayed.

The same is true in the case of long lived untreated woods, softer than white oak, like cedar and catalpa. Only screw fastenings should be used in them, in order to reap the full benefit of their durability. Mr. Cuënot's book, however, teaches us that we must not expect a perfect fastening even in the case of the screw spike. It is acted upon by adverse forces, especially when the ties are not properly tamped up to their work, and is subjected to being torn out, and to gradually working loose. These evils have to be fought against in their case, as in the case of common spikes, but not to the same extent. Mr. Cuënot presents some data with reference to the force required to pull them out of different species of woods, and also the force of loosening. We have recently had data similar to the first published in this country, both by the United States Government and by the Engineering Experiment Station of the University of Illinois.

Mr. Cuënot recognizes that the joint is the weakest place in the track, and he deduces from his experiments that the proper way to strengthen it is to place a tie directly under the center of the joint, and bring the adjacent ties on each side as close to it as is consistent with good tamping. He will find many in this country to agree with him, and many who will not, as some railroads have adopted the supported joint as standard, while others have adhered to the suspended joint. It is true that equally as good track has been maintained with the one as with the other, but can any one say which company does it with the least expense? Does it cost more to maintain first class track with the suspended than with the supported joint, all other conditions being the same? That is at present a question impossible to answer. To arrive at an approximately correct reply would require just such careful and painstaking experimental work as Mr. Cuënot has given us an example of in his new book, which is the subject of these remarks.

This study has been presented to the French Academy of Sciences.

STRESSES IN TRACKS ON CURVES.

It is believed that we shall soon be able to present observed facts obtained by accurate measurements of the radial stresses produced in curved track by cars and locomotives of different weights and wheel bases moving at different speeds. This has never before been obtained. But it also seems to be true that these stresses have not been, until now, theoretically calculated, and, therefore, the following study is made, subject to all the modifications due to the disturbing forces which occur in practice.

Track on tangents is normally subjected to vertical stresses

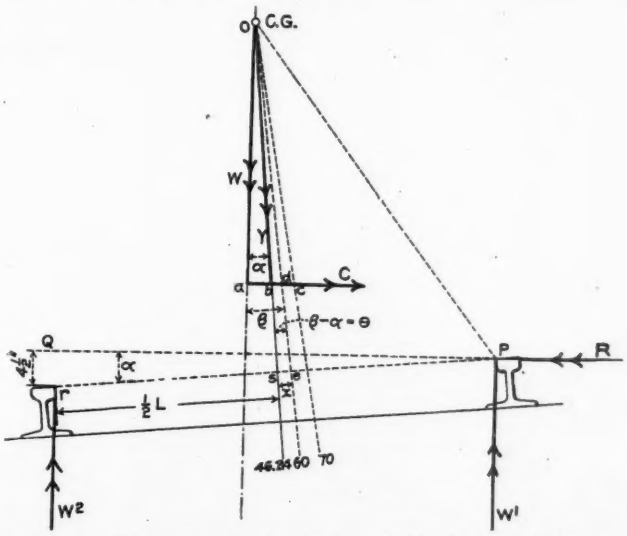


Fig. 1—Diagram of Vertical and Horizontal Forces.

only. On curves it is subjected to the same vertical loads, and in addition to horizontal thrusts arising from two causes, centrifugal force and the forces arising from the tendency of the truck to continue in a straight line. This thrust is resisted by the friction of the base of the rail on the ties or tie plate and by the shearing strength of the spikes. The magnitude of the forces acting and the resistance offered to displacement of the outer rail are both capable of mathematical demonstration. Having all the necessary data at hand in the case of the recent New York Central derailment, the following discussion will be based on the conditions obtaining there.

On the evening of February 16, 1907, an electric express train was derailed near Williamsbridge. The train consisted of two of the new electric locomotives and five cars. The front pony truck and the four pairs of driving wheels of the leading locomotive remained on the rails when the train came to a stop, but its rear pony truck was derailed. All the evidence seems to point to the conclusion that the direct cause of the derailment was some failure of the track due to obstruction or weakness occurring immediately after the first locomotive passed.

The curve at this point is 3 deg. 5 min. and had a superelevation of 4½ in. with a gage of 4 ft. 8¾ in. The rails were the Dudley section, 100 lbs. to the yard and 6 in. high, laid on tie plates on oak and pine ties spaced 21½ in. apart center to center and bedded in stone ballast. Each tie plate was secured with two spikes ⅝ in. x $^{9}/_{16}$ in. x 5¾ in.

The electric locomotives at the head of the train weigh 189,000 lbs., of which 137,000 lbs. is on four pairs of drivers. The two-wheel radial pony trucks have spring centering devices and carry

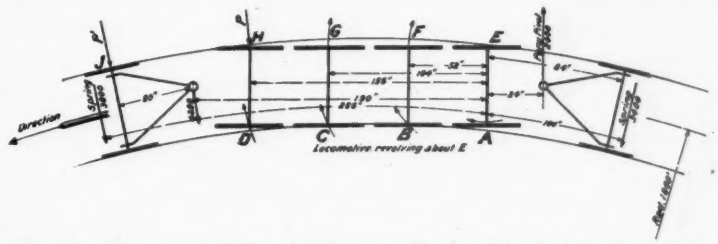


Fig. 2—Diagram of Track Stresses Under Electric Locomotive.

26,000 lbs. each. The rigid driving wheel base is 13 ft. and the total wheel base 27 ft. The height of the center of gravity of the locomotives is 44 in. above the top of the rails.

Referring to the diagram, Figure 1, which is laid out to suit the conditions above outlined. The angle q p r = a is the angle of superelevation measured from center to center of rail heads. The criterion that the effect of the superelevation shall exactly balance the centrifugal force is met when the resultant Y of the centrifugal force C and the weight W intersects the plane of the top of rails at the center s. The balanced speed can be found by the formula $\tan a = \frac{V^2}{gZ}$ in which V is the velocity in ft. per sec., g is the force of gravity = 32.166 and Z is the radius of the curve in feet. At any higher speed there is an excess of centrifugal force which resolves itself into a horizontal thrust R against the outer rail. From the formula $C = \frac{WV^2}{gZ}$ we can obtain the centrifugal force at the balanced speed, and for any higher speed the thrust R is the difference between the centrifugal force at that speed and the centrifugal force at the balanced speed.

Laying out to any convenient scale, the values of C and the weight W, the triangles of forces oab, oad, etc., are formed. The resultant force Y = o b, o d, etc., intersects the plane of the rails at s and e, etc. The value of the side thrust R is represented graphically to scale by a d — a b. From similar trianges the angle r p q or the angle of superelevation a = angle a o b. Therefore $\tan a = \frac{a\,b}{a\,o}$. The tangent of angle a o d or $\beta = \frac{a\,d}{a\,o}$ and the tangent of $\beta - a$ or $\theta = \frac{s\,e}{s\,o}$. Let s e = x. The distance s o is the height of the center of gravity above the rails or h. Solving for x we have x = h tan θ. The numerical value of $Y = \sqrt{W^2 + C^2}$. Taking now the summation of moments about the inner rail at the point r we have $\Sigma M^r = Y\,(\frac{1}{2}\,L + x) - W_1\,L - R \times$ (superelevation E) which for equilibrium = O. Solving for $W_1 = \frac{Y\,(\frac{1}{2}\,L + x) - R\,E}{L}$. Similarly W_2, the reaction on the inner rail can be found by summation of moments about p, from which $W_2 = \frac{Y\,(\frac{1}{2}\,L - x)}{L}$.

Wellington in discussing the mechanics of curve resistance* points out that when a four-wheel truck moves around a curve the front outer wheel only presses against the rail and that the other wheels exert no outward lateral pressure on the rails due to change of direction alone. We have here to deal with a more complicated

*Economics of Railway Location, p. 282.

vehicle having radial front and rear pony trucks with spring centering devices and a rigid eight-wheel truck formed by the drivers. In rounding a curve the wheels would probably assume the positions shown on the diagram, Fig. 2. They are guided by the flange pressure P^1 on the outer wheel of the front pony truck and by the pressure P on the front outer driver. The locomotive as a whole would pivot about either E or F, and it can be shown by the theory of least work that it would pivot about E in the case under consideration. Driving wheels A, B, C and D would slip laterally inward and longitudinally backward due to the smaller radius. Wheels H, G and F would slip laterally but the slip would be self-contained at H and would not produce pressure on the rail. The front pony truck is pivoted to the main frame 50 in. back of the axle and the centering spring is attached 16 in. in front of the axle. The amount of the deflection can readily be calculated and the corresponding pressure on the centering spring and the resulting pressure on the pivot can be found. For the case under consideration the values are as shown on the diagram. The pressures exerted by the rear pony truck can also be found in a similar manner.

The force necessary to produce slipping of the wheels on the rails is the product of the coefficient of friction between wheel and rail and the actual wheel loads at any given speed already determined. The usual coefficient of friction of 0.25 is perhaps high since the surfaces are moving over each other at high speeds, but it should be used to give the maximum forces. If now we take the summation of moments about E of all the forces acting, including the spring and pivot pressures of the front and rear pony trucks and place it equal to zero we have an equation which can be solved for P, the pressure against the rail at H. This equation would be of the form

$$P = \frac{52\,F + 104\,G + 60\,A + K^1 B + K^2 C + K^3 D + 100\,(3{,}400) - 34\,(2000) - 190\,(4{,}200) - 256\,(3{,}800)}{156.}$$

K^1, K^2 and K^3 are the diagonal distances of the different wheel contacts from E.

From the position assumed by the driving wheels it will be seen that the flanges of the front and rear outer drivers only press outward against the rail. The unbalanced centrifugal force R already found is resisted by the pressure on these two driving wheels since the truck wheels are held against the rails only by spring pressure. The total thrust at H therefore is $P + \frac{1}{2} R$. To allow for impact the amount of the thrust due to centrifugal force $\frac{1}{2} R$ should be increased by one-half so that the total thrust would be $P + \frac{3}{4} R$.

The resistance to this outward thrust is that offered by the friction between the rail and the tie plates and the shearing strength of the spikes. The friction is the wheel load at any speed multiplied by the coefficient of friction 0.25. The shear on the spikes is evidently $= P + \frac{3}{4} R$ — Friction. This shear is divided between at least two spikes so that the shear in any one spike is

$$\frac{P + \frac{3}{4} R - F.}{2}$$

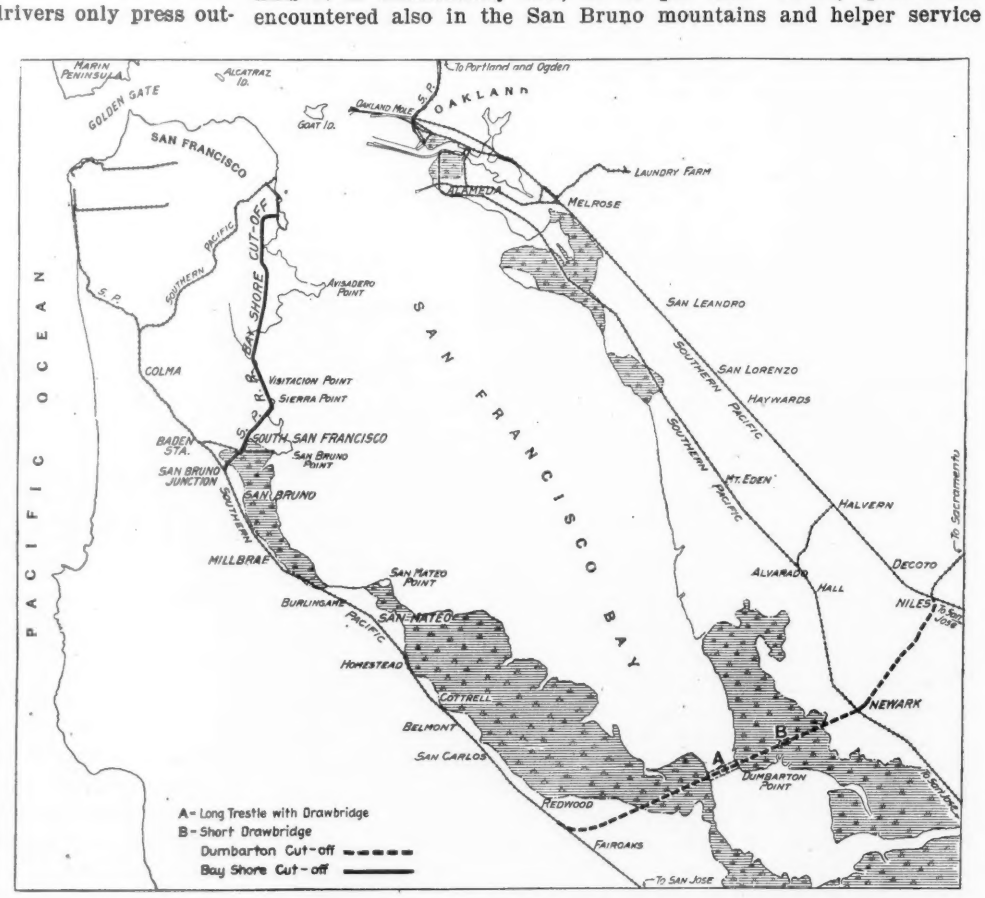
The engineers of the New York Central have made calculations of the stresses developed in the track by electric locomotives and by Atlantic (4-4-2) type steam locomotives which will be printed next week. While the above analysis was made independently and without knowledge of the methods employed by them, it is found that the results are very close together, and that with the exception of some slight changes in the form of the equations due to refinements not here considered, the theoretical assumptions must have been identical; but they made no allowance for impact. The complete outline of the calculations is given here because it is believed it is the first attempt to solve the problem of track stresses in curves with mathematical exactness. Wellington discusses the theory of the mechanics of curve resistance fully in the "Economic Theory of Railway Location," but without applying his conclusions to the solution of any problem of this kind.

A New Locomotive for the Northern Railway of France.

The Northern Railway has recently built an exceptionally heavy locomotive for freight service, intended especially for coal trains. It is of a new type and is probably the heaviest in use in Continental Europe. It is a compound machine with an articulated frame, and really consists of two engines connected by a bogie. The cylinders of the two engines take steam from one boiler that is fitted with a firebox of unique design. In other words, the machine has a single evaporating apparatus and a double mechanism. It has a length of more than 52 ft., and its weight in working order rises to what, in France, is considered the "enormous" figure of 231,950 lbs. Each set of engines at the front and rear drives three pair of coupled wheels; while, at the center, the carrying or bogie truck has four wheels, making 16 in all, that are beneath the engine. The tanks and bunkers that are set alongside the boiler will carry 11,000 lbs. of coal and 3,400 gals. of water. It will have a tractive power capable of hauling a train weighing 1,800 metric tons, of which 1,000 tons will be lading. Up to the present time, the heaviest trains that have been hauled do not weigh more than 600 metric tons.—*Le Journal des Transports.*

The Bay Shore and Dumbarton Cut-Offs of the Southern Pacific.

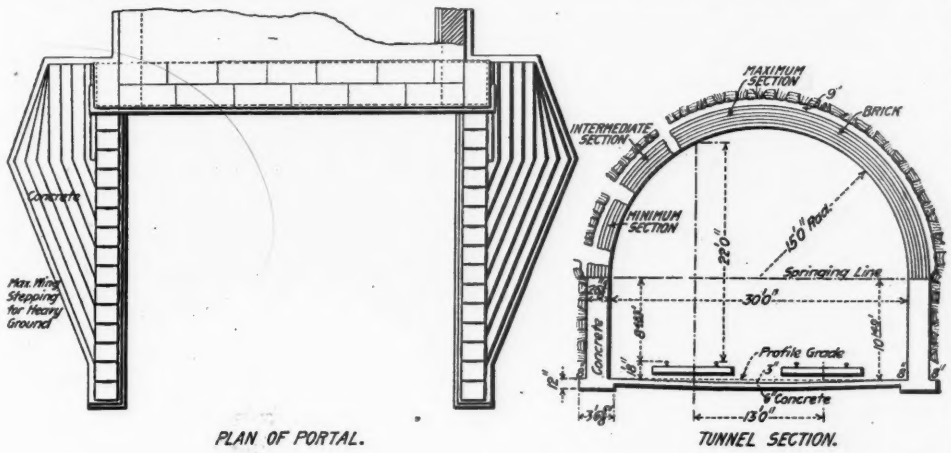
The Bay Shore cut-off of the Southern Pacific, south of San Francisco, begun in 1904, is nearing completion. As stated in a preliminary account of the work in the *Railroad Gazette*, Nov. 18, 1904, the line was built to secure a more direct and easier entrance into San Francisco for the trains of the Coast division. The present line from San Bruno into the city has heavy grades and curves along a narrow right-of-way, and for a considerable part of the distance is through a thickly populated section of San Francisco, the track being laid across blocks and through streets with heavy traffic. The need of conforming to the street grades necessitated the heavy grades and sharp curvature referred to, and helping engines have to be used over parts of the line for both passenger and freight trains. Southbound the maximum grade out of San Francisco through Mission hills to the summit at Ocean View, about five miles, is 158 ft. per mile. Northbound through these hills it is considerably less, 68 ft. per mile. Heavy grades are encountered also in the San Bruno mountains and helper service



Map of Bay Shore and Dumbarton Cut-Offs of the Southern Pacific.

required. Furthermore, the line makes a wide detour to the west, adding about four miles to the air line distance. As the accompanying map shows, the new cut-off is as nearly a direct line between San Bruno and the San Francisco terminus as it was practicable to make it. The actual length of new construction from existing tracks of the Southern Pacific in Seventh street, San Francisco, to junction with the original line at San Bruno, is 9.84 miles. The maximum gradient is three-tenths of 1 per cent., compensated

for curvature, and there are 10 curves, most of which are light. The junction curve at San Bruno is 4 deg. and there is one 2 deg. 54 min. and one 2 deg. curve, the rest being 1 deg. or under. The right-of-way and general design of this railroad are for a four-track line, but it is being built with two main line tracks at present, the remaining two tracks to be added when the volume of traffic warrants it.



Detail of Tunnels and Portals, Southern Pacific Bay Shore Cut-Off.

The bay shore is quite rugged, and to avoid the heavy curvature following the shore line five tunnels, aggregating nearly two miles of double-track bore—about 20 per cent. of the total length of the line—were built. Beginning at the northernmost tunnel, No. 1 is 1,817.3 ft. long through massive serpentine with clay seams. No. 2 is through similar material and 1,086.4 ft. long. No. 3, 2,364 ft. long, is partly through wet sand with seams of clay, and partly through very hard silicated formation. No. 4 is 3,547 ft. long and is mostly through very wet ground with quicksand and clay layers, with part through medium shale. The last, No. 5, 1,133.8 ft. long, is through hard sandstone. Next to the tunnel work the heaviest earthwork was at Visitacion point, where a cut 95 ft. deep, requiring the removal of some 750,000 yds. of material, was made. The excavated material was used in filling the cove north of the cut, known as Visitacion bay, where a large freight terminal will be built, the plans for which were described in the *Railroad Gazette* of January 4, 1907. It will contain complete facilities for receiving, despatching, classification and storage purposes, with division repair shops and a 40-stall roundhouse. It will be the first hump yard to be built in the vicinity of San Francisco, and the second on the Pacific coast, the first being the Southern Pacific yard at Roseville, Cal., built last year.

All of the tunnels were built for double-track. However, No. 2 has had the portal completed for four tracks, as the presence of a city street close to the side reserved for the third and fourth tracks required the construction of a high concrete retaining wall as part of the present work, and the portal for the second bore was therefore built at the same time. With the exception of No. 5, at Sierra point, which was built by cut and cover, the tunnels were taken out around a center core left to support the false timbering, this core being about 18 ft. high and 13 ft. wide. The false timbering was necessary to resist the rock pressure, which in some places was extremely heavy. The timbering was supported from the core by diagonal and vertical posts. In making the excavation, two bottom drifts about 8 ft. by 7 ft. were first driven on each side of the center core, followed by two drifts immediately over the first two and of about the same dimensions. These were followed by a heading drift between top of core and crown of excavation, the intermediate material between the upper side drifts and this heading drift being taken out last of all. All of the excavated material was removed through the bottom drifts, to which it was delivered from above by suitable chutes. The average progress in each end of each tunnel was a little over 4 ft. a day, or approximately 8 ft. a day total progress. The tunnel excavation of maximum section, including an assumption of 6 in. all around the masonry, was approximately 32.2 cu. yds. per lineal foot. No power drills were used except in the extra hard rock in tunnel No. 3.

The tunnel side walls and invert are of concrete, and the arch of brick. The latter has three different thicknesses of section according to the material passed through, as shown by the accompanying drawings of tunnel details. The packing between tunnel lining and natural material is in some cases broken rock and in some cases concrete, likewise depending on the nature of this material and the consequent overhead pressure. The centering for the brick arch was formed of steeel I-beams, 10 in. deep, joined at the crown. The portals are made of common hard-burned red brick, with buff sandstone trimmings. The portals are not adjusted to the present surface of the ground, but to the surface as it will be when the city streets and included property are graded to official city grades.

The series of photographic views shown illustrate the methods of tunnel construction and the appearance of the portals. One shows the five drifts already referred to, the top heading having just been begun. This is the north end of tunnel No. 3 and is an example of the application of the process to very bad ground. Another shows a view of the timbering for this same tunnel and the steel I-beam centers for the brick arch, taken two months after the preceding view. A detail view of the interior timbering from the springing line up and of the I-beam centers is also shown,

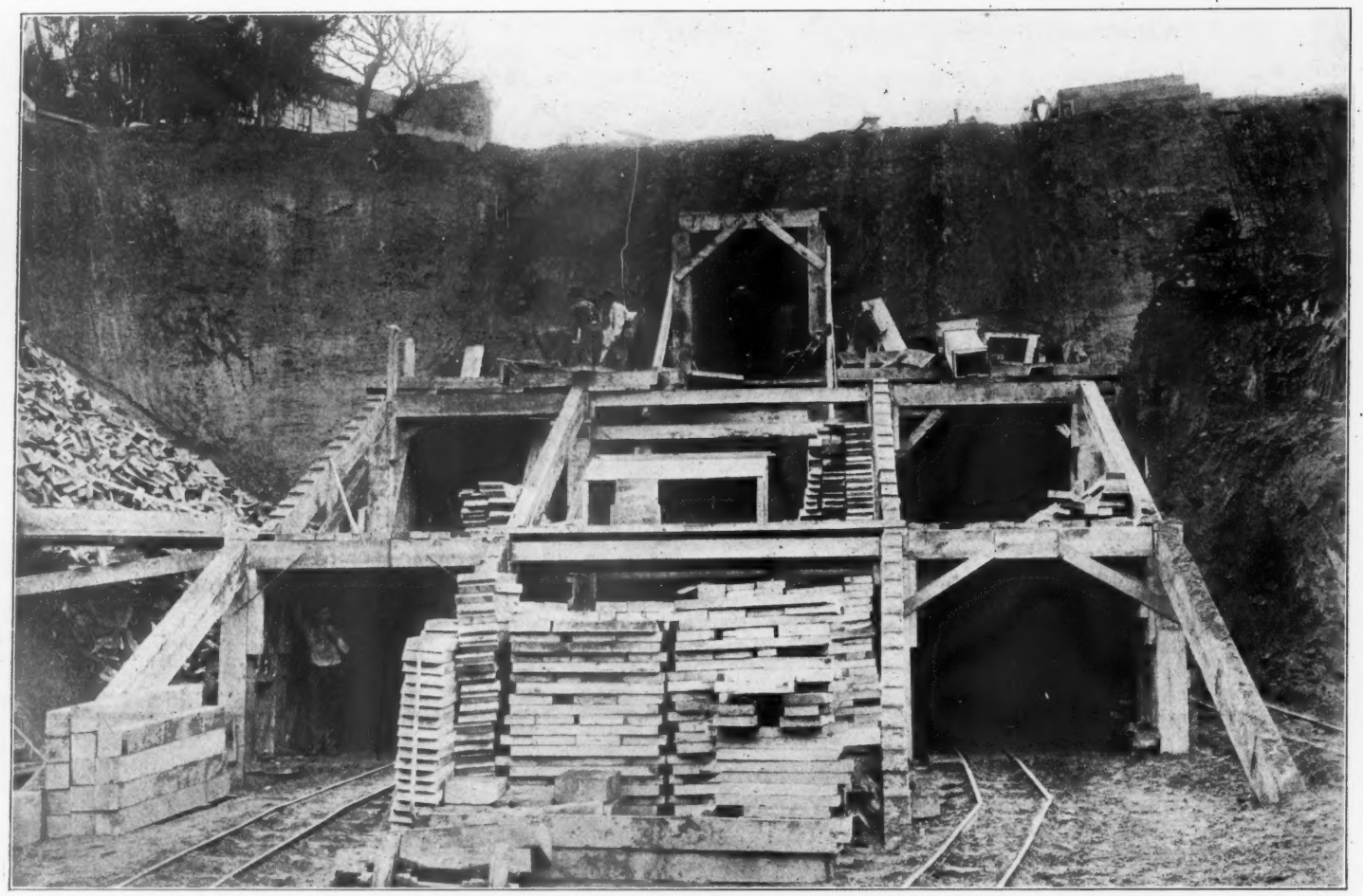
Completed Arch, I-Beam Centers and Top of Center Core.

the centers being footed on sand boxes just above the springing line. One of the views shows the center core and completed brick arch, and further along the lagging and I-beam centers. There is a view of the traveler used for hoisting brick and mortar, concrete material and other material, by electric hoist, to run out on the

track on top of the center core and the tracks to the several drifts. The south end of tunnel No. 4 is shown with contact between masonry portal and earth excavation made by hand-laid dry rubble. The north end of tunnel No. 2, with double portal, is shown in another photograph, the concrete retaining wall referred to being on the right. The other side has an ordinary wing. There is also a view of another special portal—the north end of tunnel No. 1—which has on one side a concrete retaining wall 55 ft. high. The bridge in the foreground carries Mariposa street over the new tracks, and just beyond the bridge is seen a girder crossing for a steam road.

The Bay Shore cut-off is to be ready for service in the fall, and part of the freight terminal by the end of the year. The entire work, which was planned under the supervision of William Hood, Chief Engineer of the Southern Pacific, is being carried out under the immediate direction of W. E. Marsh, Assistant Engineer. Most of the grading and tunnels Nos. 2 and 4, were done by contract. The remaining tunnels, and all other work, were done by company forces under Mr. Marsh.

North End of Tunnel No. 2; Bay Shore Cut-Off.



North End of Tunnel No. 3, Showing Five Drifts Around Center Core; Bay Shore Cut-Off.

The Dumbarton cut-off, also shown on the map, is to bring the lines on the Oakland side of the bay into close communication with the San Francisco terminals. Work on this is just being begun. The line from Portland, Ore., and the line from Ogden, Utah, as well as a number of local lines now run to Oakland, whence freight must be transferred by car ferries to San Francisco or sent south around San Francisco bay by a "wish-bone" route via San Jose nearly 100 miles long. The Dumbarton cut-off is to run from Niles, which is about 25 miles southwest of Oakland on the easternmost of two parallel Southern Pacific lines running south to San Jose, via Newark on the western of these two lines, to Redwood City on the direct San Francisco line of the Southern Pacific. From Niles to Newark is five miles and from Newark to Redwood City 11 miles, making the total length of the new cut-off 16 miles. As will be observed by the map, the southern end of San Francisco bay is lined with tidal flats. The cut-off strikes these marshes almost immediately after leaving Newark. Over them on both sides of the bay a great deal of filling will have to be done. On the

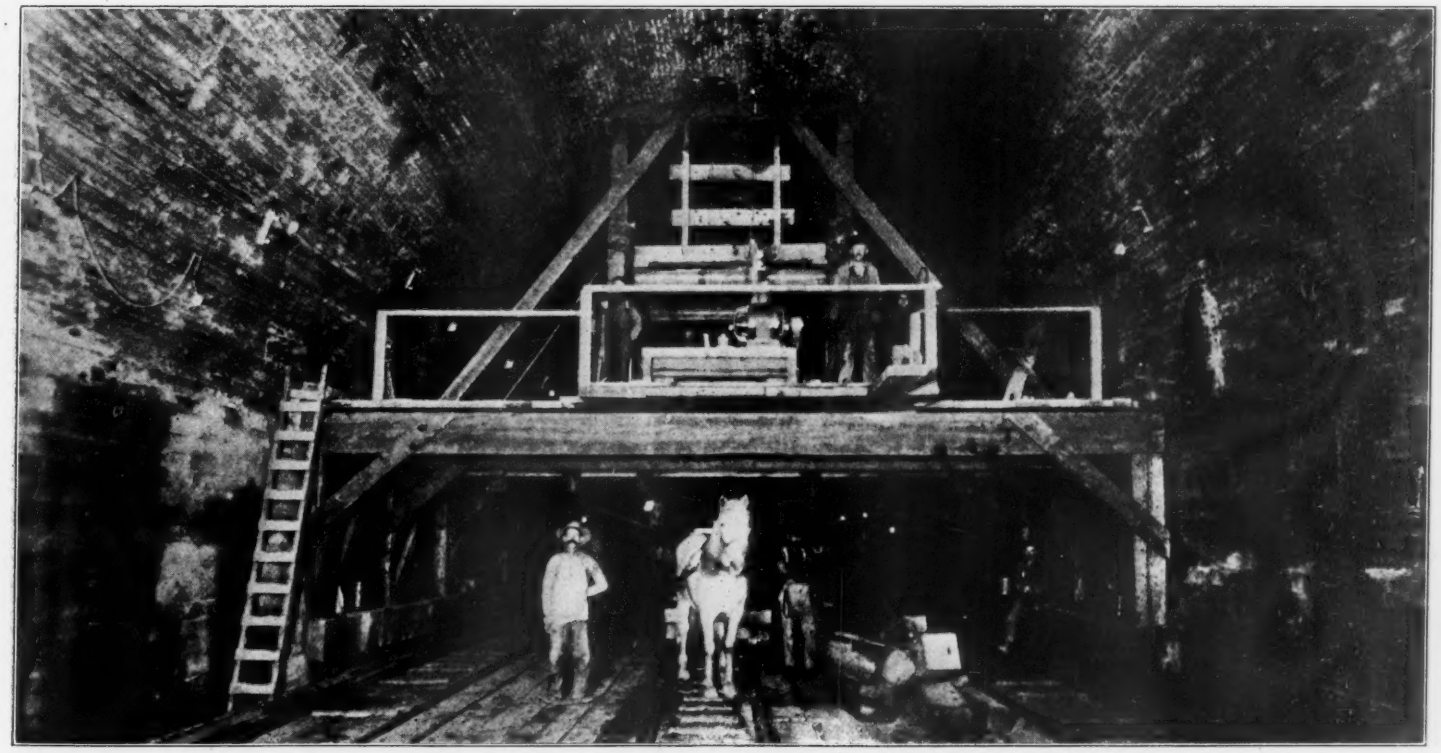
South End of Tunnel No. 4.

eastern side of the bay over Newark slough there will be a double-track steel drawbridge 182 ft. over all, supported on a central pivot pier with a short trestle approach at each end. Two miles west of this bridge will be a great double-track steel drawbridge from Potrero or Dumbarton point across the deep water of the bay to the western shore near Ravenswood point. The eastern approach is to be 1,145 ft. of ballast deck trestle work. The drawbridge will be 130 ft. over all with 155 ft. radius. It is to give a clear space of 125 ft. on each side of the central column support. The center

Mariposa Street Bridge; Bay Shore Cut-Off.

pier will be a circular iron, 40-ft. caisson filled with concrete. The depth of water is about 70 ft. at the draw. The trestle approach on the west side of the drawbridge is to be 5,500 ft. long, making the total length of the bridge, including the draw span, 6,955 ft. The trestle will be of heavy construction with six-pile bents, 15 ft. between centers. The bents will be surmounted by heavy caps and stringers. Rock and gravel filling will be used for most of the trestle.

With completion of these two cut-offs and the proposed Bay Shore yards, the Southern Pacific's terminal facilities on San Francisco bay will be greatly unified and improved. It will be possible to run freight cars from any one of the through lines from the south, east or north directly into the city of San Francisco. On through freight from Ogden for instance, which constitutes a most important part of the through traffic to San Francisco, there will be a saving by the new cut-off of nearly 50 miles and two car ferry transfers, one across the straits of Carquinez, the other across San Francisco bay.



Electric Hoist Traveler; Bay Shore Cut-Off.

The Schlemmer Case.

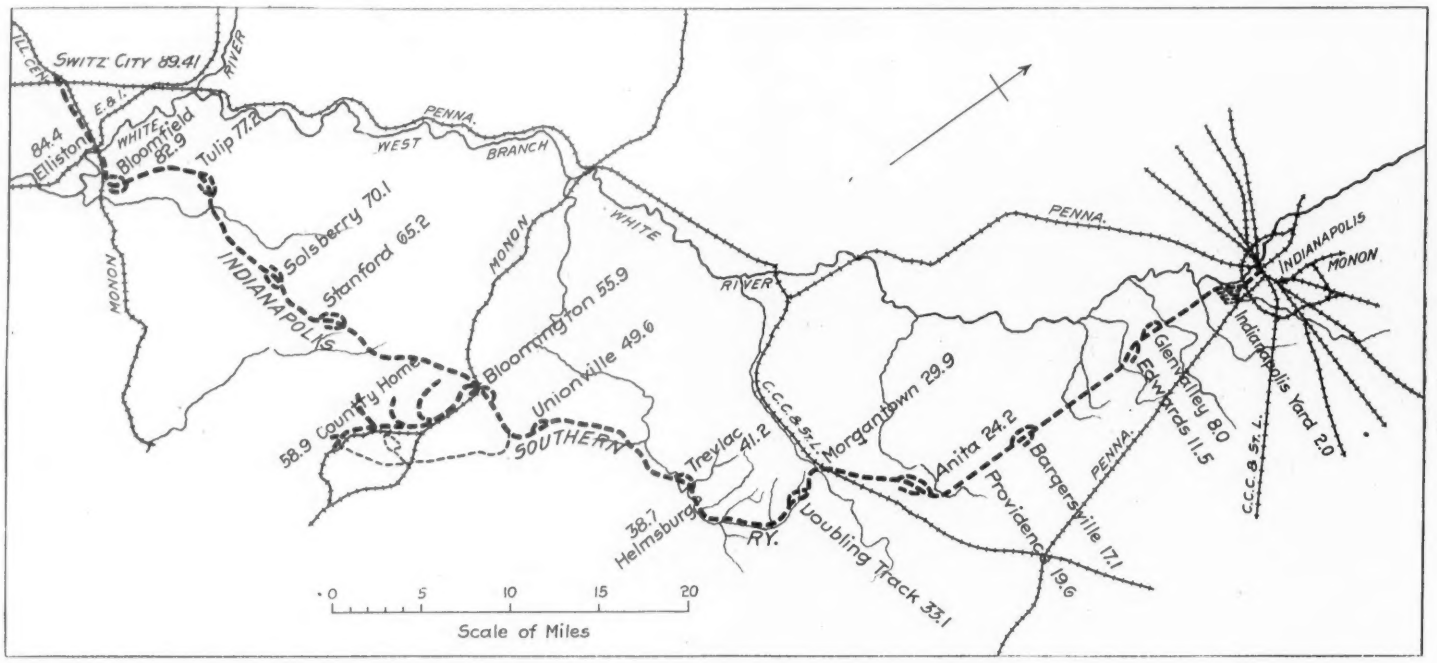
The Supreme Court of the United States has handed down a decision sustaining that clause of the Safety Appliance Law (Sec. 8), under which an employee injured in coupling cars not equipped according to law is not to be deemed to have assumed the risk of working with the deficient or defective equipment even if he continues at work after he knows of the defect or deficiency. The case was that of Catherine Schlemmer against the Buffalo, Rochester & Pittsburg Railway. The plaintiff, Catherine Schlemmer, sued in the State courts of Pennsylvania to recover damages for the killing of her husband, a brakeman, killed while endeavoring to couple together two cars which had not been equipped with automatic couplings. He had to go between the ends of the cars and crouch down below the level of the platform of the rear car, which was being propelled slowly along the tracks by the engine. Through no fault of his own he failed to make the desired coupling, and the cars came together, crushing Schlemmer's head between them.

The trial judge directed the jury to return a verdict for the railroad on the ground that the Safety Appliance Laws in question had no application to the case, and that if they did Schlemmer had been guilty of contributory negligence, which would bar him from making a recovery, because while making the coupling he had raised his head too high, though warned by the yard conductor, who was superintending the making up of the train, to keep it down. This ruling on appeal was affirmed by the Supreme Court of Pennsylvania, although it was urged in that court, as it had been in the trial court, that the injury which Schlemmer suffered was a risk incident to the coupling of cars not fitted with automatic couplings, and that the Federal Safety Appliance Laws expressly declared that a railroad employee who was injured by any such car when used in interstate commerce should not be deemed to have assumed such risks.

The Supreme Court of the United States, by a vote of five to four, has now reversed the judgment of the Supreme Court of Pennsylvania and remanded the case for a new trial, holding that under the circumstances disclosed by the evidence the Safety Appliance Laws in question should have been given effect by leaving the question of the alleged contributory negligence of the deceased to the determination of the jury. The Brotherhood of Railroad Trainmen furnished the funds for printing the record and briefs, and Secretary Moseley, of the Interstate Commerce Commission, aided by F. D. McKenney and L. M. Walter presented the case before the Supreme Court.

The Indianapolis Southern Railroad.

The Indianapolis Southern Railroad is a consolidation of the Indianapolis Southern Railway, recently built between Indianapolis and Switz City, Ind., and the Effingham district of the Illinois Central Railroad, extending from Switz City, Ind., to Effingham, Ill.

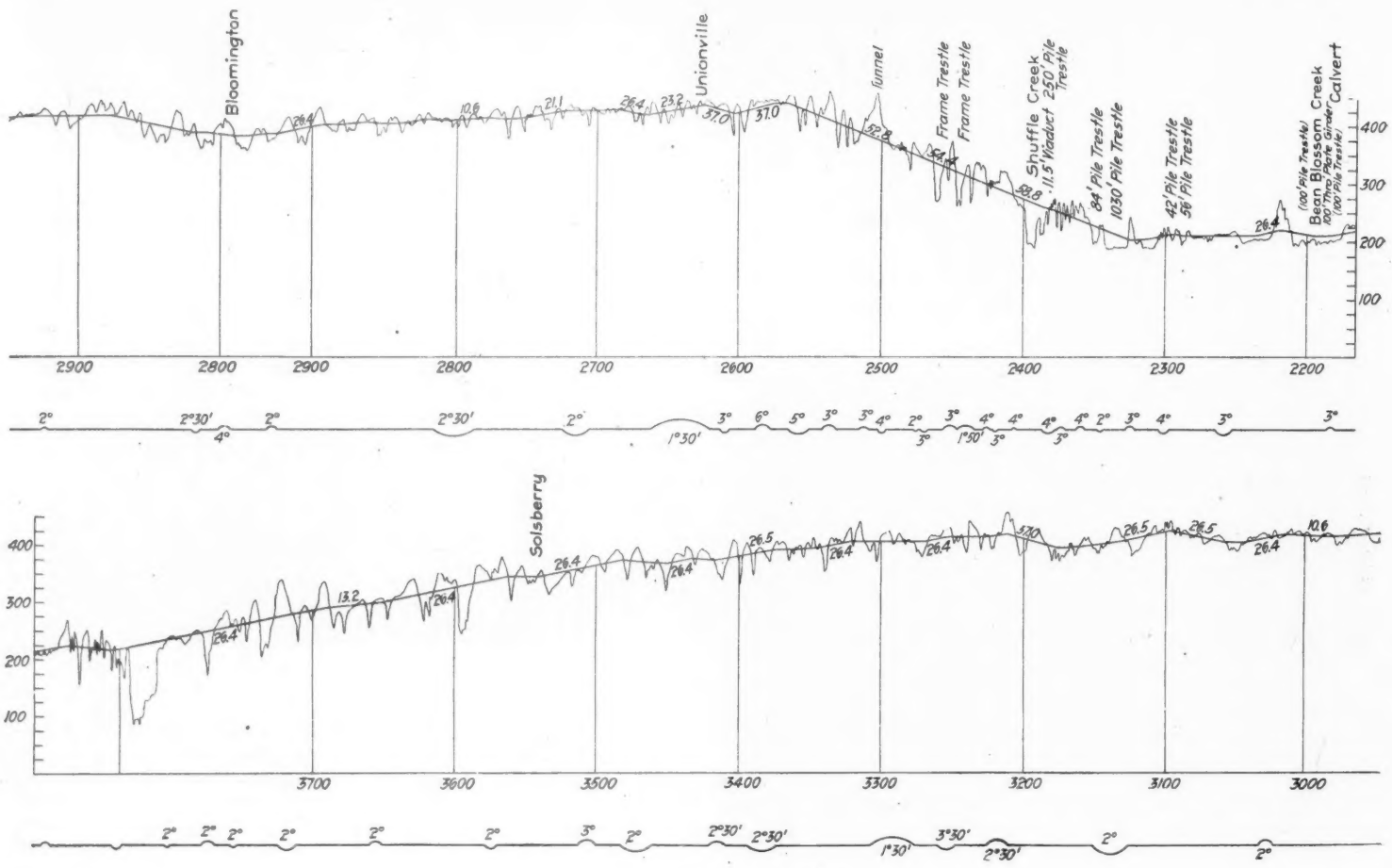


Sketch Map of the Northern Part of the Indianapolis Southern.

For convenience of description, that portion of the consolidated line formerly a part of the Illinois Central will be designated as the Effingham district, and the Indianapolis Southern Railway as the Indianapolis district.

The line between Switz City and Effingham has been in operation for some time. It is 88.51 miles long and as originally built was of the cheapest construction, alinement and grade both being sacrificed to secure a line of railroad capable of operation for light traffic at a minimum construction cost. Under the consolidation it is proposed to place this district on such a physical basis as to secure a minimum cost of operation and maintenance. The grades between Switz City and Palestine are now being reduced to a maximum of one-half of 1 per cent., compensated .04 per cent. per degree of curvature, with an additional compensation of one-tenth of 1 per cent. for a distance of one-half mile each way from passing-siding stations. The maximum curve will be 4 deg. and all curves of 2 deg. or more are to hape spiral approaches. The bridges will be built to carry Cooper's E-50 loading. The track will be laid with 75-lb. rail with 12 in. of ballast, and additional passing sidings will be built to provide facilities for handling a large increase in business, this constituting the heaviest part of the reconstruction. This work is expected to be completed and ready for operation June 1, 1907, and it is hoped to have the remainder of the district in first class condition before the close of the present year.

The Indianapolis Southern Railway—the Indianapolis district—extending from Indianapolis to Switz City, a distance of 89.23 miles,



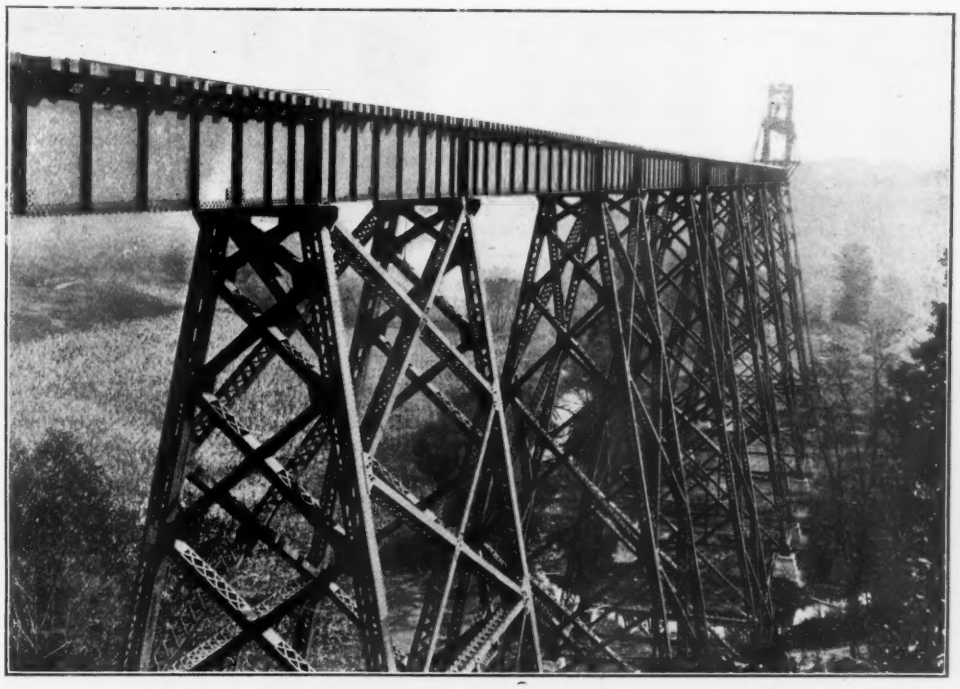
Profile of the Indianapolis Southern.

Passenger Station at Bloomington; Indianapolis Southern.

was organized and financed at the outset by local capitalists and manufacturers of Indianapolis. The promoters of the enterprise felt the need primarily of placing the capital city of Indiana on a direct line of transportation to the shale and clay deposits of Brown, Monroe and Greene counties, the unexcelled oolitic stone formation in Monroe and Lawrence counties, and the immensely valuable coal fields in Greene and Sullivan counties; and, secondarily, to provide additional facilities for the movement of manufactured products from that rapidly developing industrial center. The original plan contemplated the construction of a railroad 111 miles long, whose main line would extend from Indianapolis south through Marion, Johnson and Morgan counties, and southwest through Brown, Monroe, Greene and Sullivan counties to Sullivan, and also provided for the necessary branch line construction to reach the accessible mineral deposits.

Building was begun in October, 1903, and in the summer of 1904 a part of the north 50 miles was graded. But the promoters of the project encountered financial difficulties, the result of which was the acquirement of its control by the Illinois Central and the consolidation with the Effingham-Switz City line, or Effingham district. The westerly terminus of the new line was accordingly changed to Switz City, which effected a saving of 22 miles of construction over that originally planned with the westerly terminus at Sullivan.

The new owners immediately made careful surveys to secure a reduction in gradient from a maximum of 1 per cent. uncompensated, to one-half of 1 per cent. compensated, to eliminate excessive curvature and reduce the total rise and fall of grade line over those portions of the line where grading was not well under way. The country adjacent to the westerly half of the line was carefully exploited and a location worked out which showed that a new line with one-half the maximum grades, less curvature, one-half the rise and fall of grade line, and a shortening of three miles in distance, could be built, and at no increase in cost over the original plan. The new location was such as to render useless three miles of completed work and a partially completed tunnel, but it likewise avoided the construction of 3,900 ft. of tunnel through the city of Bloomington, and a very costly viaduct construction north of Bloomington over Hinckle creek. The new location caused a suspension in actual construction



Richland Creek Viaduct, near Bloomfield, Ind., 2,215 Ft. Long.

Bridge Over the White River; Indianapolis Southern.

until May, 1905. The whole line was completed and put in operation last December.

From Indianapolis to Morgantown, a distance of 30 miles, the line traverses the gently undulating valley of White river and crosses the lower courses of several of its tributaries. This region has been smoothed over by glacial action, has no abrupt breaks in the surface and yields to easy alinement and low gradients at a reasonable cost per mile. From Morgantown to Shuffle creek, a distance of 14 miles, the line crosses the water-shed between Indian creek on the north and Bean Blossom and Shuffle creeks on the south. The Indian creek approach to the summit is rough and broken and required heavy construction for 1 per cent. maximum grades, whereas the Bean Blossom and Shuffle creek approach presented no difficult or heavy work for one-half of 1 per cent. grades.

The middle portion of the line from Unionville, 49 miles from Indianapolis, to Stanford, a distance of 17 miles, occupies the Bloomington plateau, which is approximately 250 ft. higher than the valley of Shuffle creek. The north approach to the plateau, 4½ miles long, was built on a maximum grade of 1 per cent. and represents the most costly section of the district. Practically all the excavations on it were made in solid rock. The section embraces Shuffle creek viaduct, 880 ft. long, and a tunnel 525 ft. long. The westerly approach to the

Bloomington plateau extends from Stanford to Bloomfield, a distance of 18 miles. In this distance a difference of 230 ft. in elevation is overcome by using one-half of 1 per cent. compensated grades, and provision is also made for relief grades at the passing track stations of Solsberry and Tulip. Portions of this section introduced heavy grading work, and a steel viaduct 2,215 ft. long and 160 ft. high over Richland creek.

From Bloomfield to the westerly terminus at Switz City the line crosses the wide valley of White river. West of White river the surface is gently undulating and is ordinary construction work. The bridge construction across the White river is referred to more particularly in a subsequent paragraph.

The heaviest traffic originating on the district will be from the oolitic stone quarries near Bloomington, which will move both north and south, whereas a large percentage of the traffic originating from the coal mines in Greene and Sullivan counties will move north. As built, the maximum grades between Indianapolis and Unionville are 1 per cent. southbound and one-half of 1 per cent., compensated, northbound. Between Unionville and Switz City the grades are one-half of 1 per cent. in both directions, compensated for curvature, and additional compensation of one-tenth of 1 per cent. at passing-track stations.

The bridge structures are designed for Cooper's E-50 loading. All steel structures have masonry supports. In every case the details of both steel and masonry construction are so arranged as to admit of the construction of second track with minimum expenditure. The timber trestles consist of six-pile bents, or their equivalent in frame trestles, with caps 12 in. x 14 in. x 14 ft., and six stringers 7 in. x 16 in., 14 ft. spans. The bridge work was an important feature in the construction work, the more important structures deserving special mention.

The entrance into Indianapolis is on an elevated structure extending from Merrill street to Wisconsin street, a distance of 3,576 ft., and is built over the bed of the open drain known as Pogue's Run. The city already had 13 lines of railroad radiating from its center, and the promoters conceived the plan of occupying the bed of the stream with a type of structure which would offer little or no obstruction to the flow of water. Pogue's Run, for the greater part of the distance occupied, is marked by masonry walls, the face lines of which are 45 ft. apart. One line of concrete masonry pedestal supports were placed in the west wall of the Run, another line in the middle of the stream, 22½ ft. distant. The lateral girders supported upon these pedestals are long enough to admit of double-track construction, for which purpose only longitudinal girders will be required. Future track construction will require a third line of piers placed in the east wall, and when complete this construction will provide room enough for four tracks. The superstructure, except at street crossings, consists of cross girders resting on the pedestals and form the supports for 75-ft. deck girders. At the street intersections the construction consists of columns supporting through-girder spans the full width of the street, with a vertical clearance of not less than 13 ft. As the city had commenced to carry out a general plan of track elevation, it was deemed advisable to make the original construction conform to it, and the grades of all streets, except South and Raymond streets, have been separated.

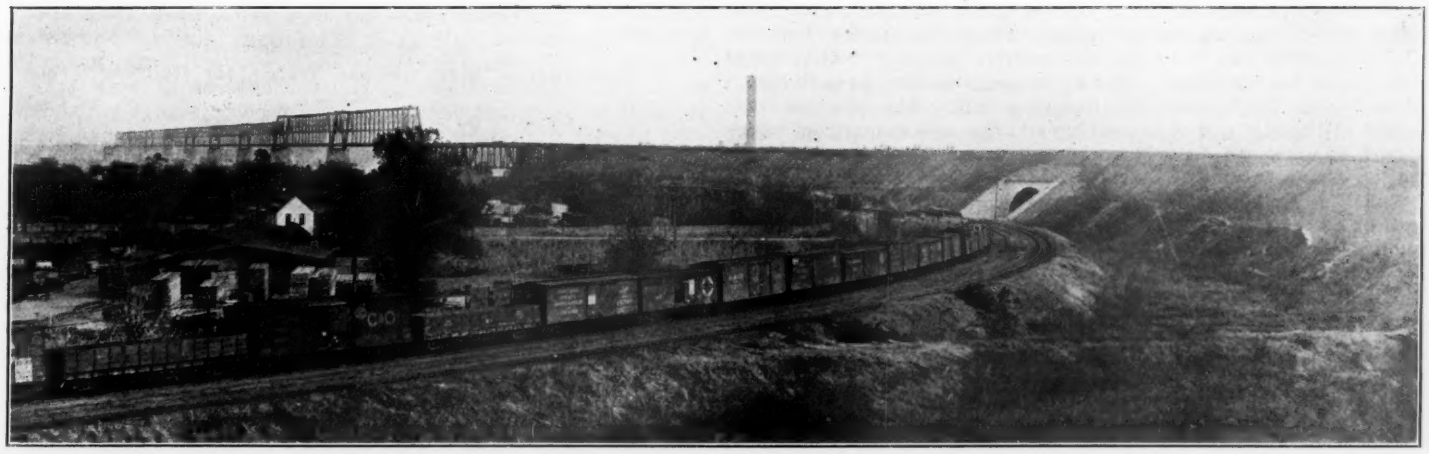
Elevated Structure in Indianapolis.

Indian creek, at Morgantown, is crossed by a deck girder bridge. The structure consists of 100-ft. span with two 55-ft. approaches. The abutments are of reinforced arch construction, similar masonry construction being used at Buck creek and at Bean Blossom bridge No. 1.

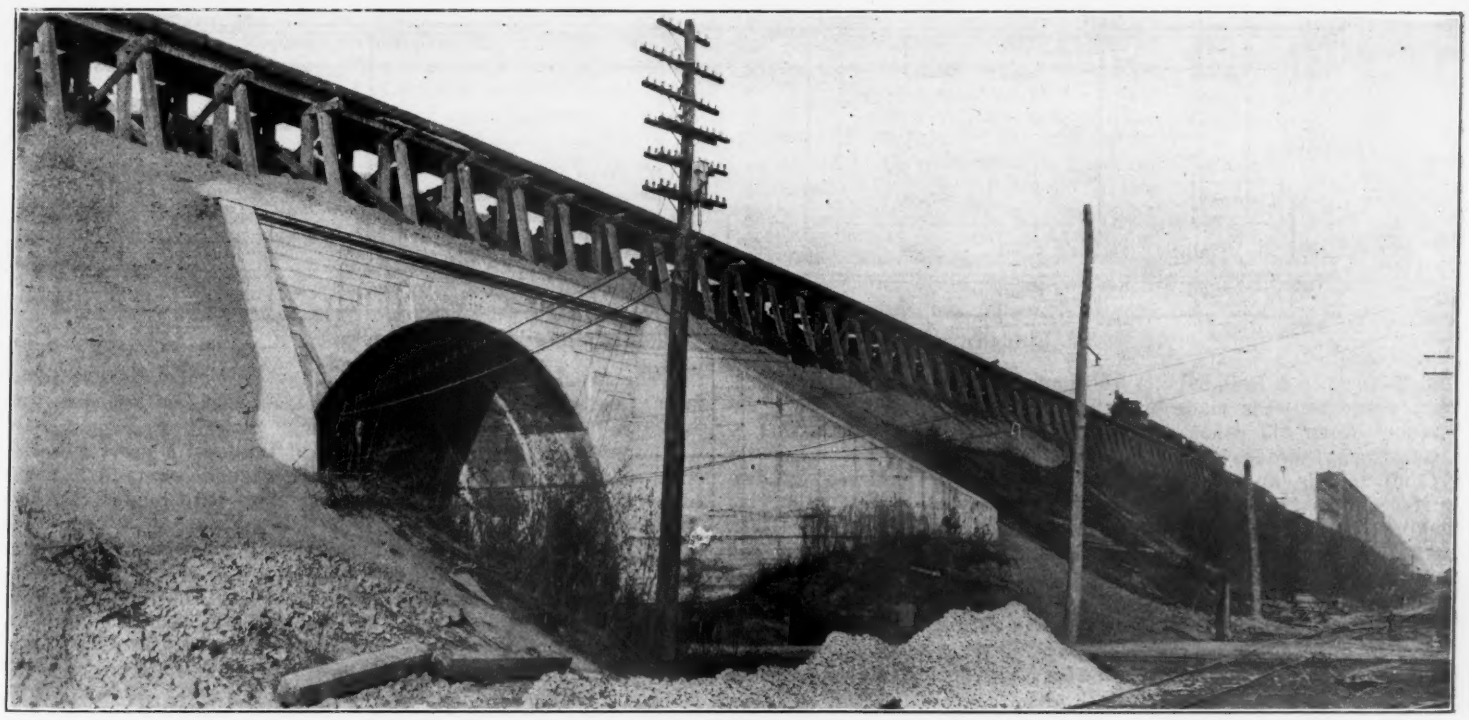
Shuffle creek viaduct is 880 ft. long and at the highest point is 80 ft. above the stream. All the supports are masonry construction except the end supports. These are of timber, which will be replaced by masonry abutments when the trestle approaches to the structure are filled. The tower spans are 40 ft. long with 60 ft. intermediate spans. The structure was erected with a derrick car in 31 days.

Cut on Diversion near Wickliffe, Kentucky; Indianapolis Southern.

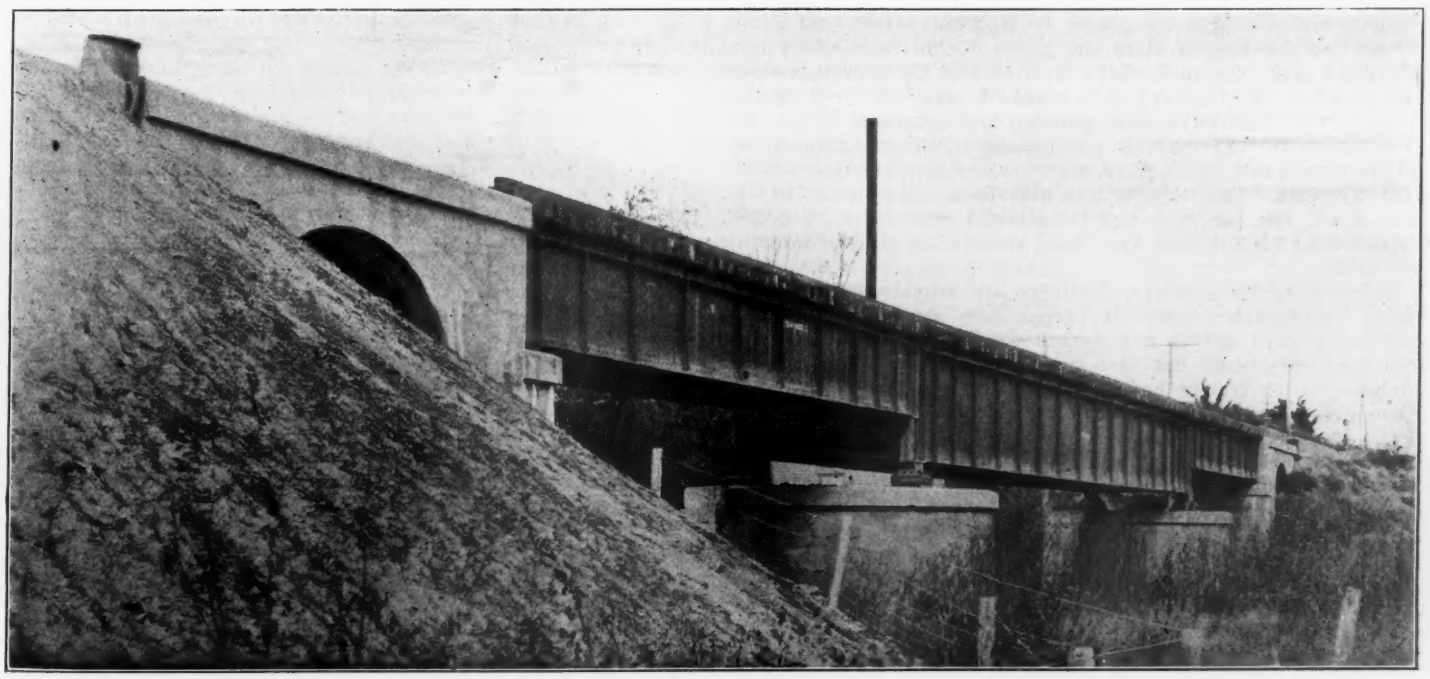
Richland creek viaduct is the most important bridge structure on the line. The total length is 2,215 ft., maximum height 160 ft., and the total weight of steel is 2,856 tons. The bridge is so designed that it can be converted into a double-track structure without interfering with traffic or disturbing the adjustment of the structure. The tower spans are 40 ft. long and the intermediate spans 75 ft.



Approach to Cairo Bridge, Showing Work of Filling.



Sixty Foot Arch, Approach to Cairo Bridge; Indianapolis Southern.



Bridge Over Indian Creek, near Morgantown, Ind., Two 60-ft. and One 100-ft. Deck Plate Girders.

The structure was erected with a trolley traveler from the deck in 62 days actual working time. The erection was carried on without loss of life or even serious injury to any one employed on the work. The stone and sand for the concrete masonry was obtained at the site of the structure. The surface depression through which Richland creek flows marks the line of a fault. The limestone was obtained at the east end of the bridge and the sandstone, from which the sand was crushed, from the west end at approximately the same elevation above datum.

The White river bridge, with its trestle approaches, has a total length of 3,324 ft. The bridge is located on a six-mile tangent which extends from the westerly limits of the town of Bloomfield to Switz City. The tangent was so laid as to cross the point of intersection of the center lines of the Chicago, Indianapolis & Louisville (Monon) and Evansville & Indianapolis Railroads at Elliston. The structure as a whole has been made to serve the crossing of White river, the channel of an old canal east of the Evansville & Indianapolis, a separation of grades and a crossing of the Monon and Evansville & Indianapolis, an overhead crossing of the "Y" between the two surface railroads, and also to provide a subway for a very important public highway. The river crossing proper consists of two 150-ft. deck riveted spans and one 100-ft. deck girder span. The overhead crossing of the two railroads is a 72-ft. through I-beam floor girder supported by columns placed on masonry pedestals. The structure is given longitudinal strength by placing columns on masonry supports on one end. The overhead crossing of the "Y" is made of a 25-ft. through girder. The canal and highway are provided for by the proper spacing of pile trestle bents.

The total weight of the steel used in bridges is approximately 6,400 tons. The 100-ft. girders at Pleasant Run, Lick creek, three crossings of Bean Blossom creek, and Shuffle creek, were erected by the railroad company's forces. The larger structures were let to contractors at unit prices.

On the entire district the grades of important streets and public highways were separated from the grade of the railroad. Public passways in many instances were diverted and the crossings made either by means of a subway or overhead bridge, and in a number of places public highways were diverted and crossings of the railroad eliminated. The railroad was located in Bloomington, a city of 10,000 inhabitants, through an important resident section without a grade crossing. The track is laid with 75-lb. rail, with 3,200 6-in. x 8-in. x 8-ft. ties per mile, and is ballasted with 12 in. of gravel. Passing tracks 3,200 ft. long have been provided at average intervals of 5½ miles.

At Indianapolis passenger facilities are provided at the union station. The freight terminals occupy two squares, bounded by South and Merrill streets and Senate and Missouri avenues. Provision for local freight has been made for the present by building an inbound brick freight house, 40 ft. x 530 ft. The north 180 ft. is two stories, containing quarters for the local freight clerical force and the offices of the local superintendent.

Bloomington, the second city on the line, has separate freight and passenger stations. The passenger station is of white Bedford oolitic stone, located on College avenue on the north side. The freight station is a frame structure located within three squares of the center of the business section. Commodious stations and ample business facilities have been established at all passing-track stations, and additional stations have been provided at other important community centers.

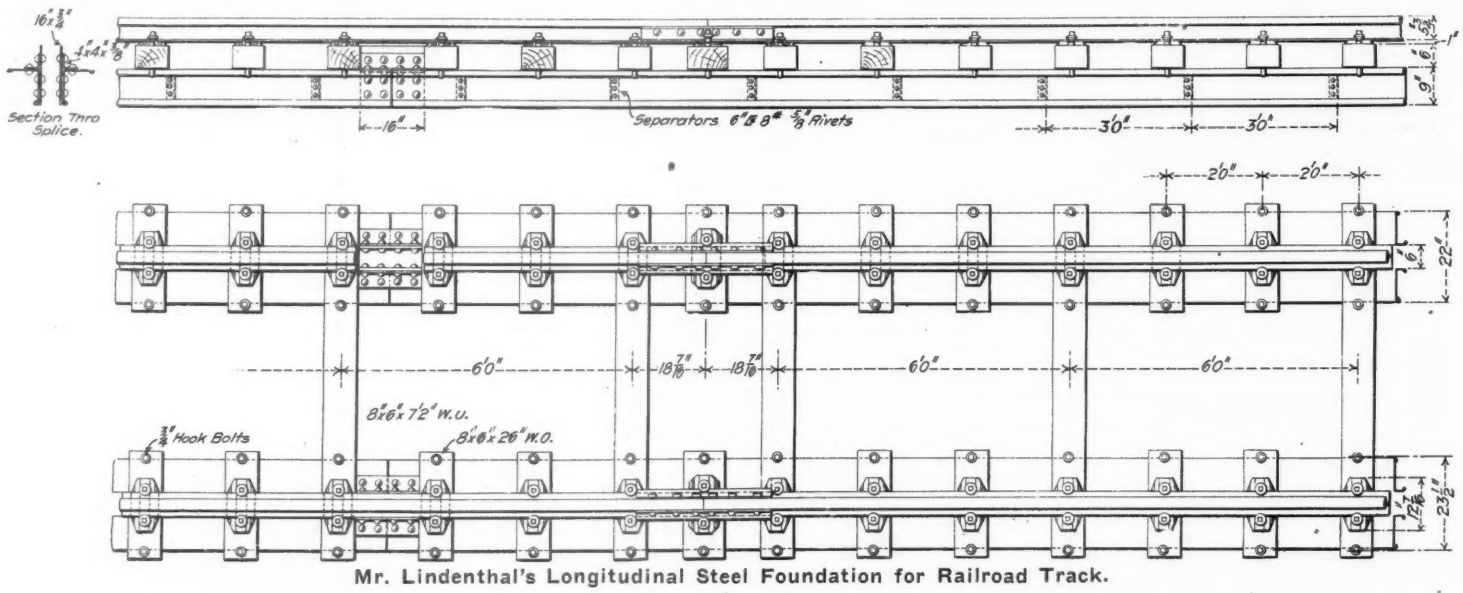
Physical connections have been made at Indianapolis with all lines entering that city through the Union Railway and Indianapolis Belt Railroad, at Morgantown with the Big Four, and at Bloomington and Bloomfield with the Monon.

We are indebted to Mr. W. J. Harahan, Vice-President of the Illinois Central and of the Indianapolis Southern, and to Mr. A. S. Baldwin, Chief Engineer of both lines, for the information and illustrations.

A Longitudinal Steel Sleeper System for Railroad Track.

BY GUSTAV LINDENTHAL, C.E.

There is at present a test being made on the Pennsylvania Railroad at Pomeroy Station on the main line between Philadelphia and Harrisburg with a longitudinal steel sleeper system about 1,000 ft. long. The steel sleepers have been riveted up temporarily of shapes to resemble the steel bulb angles shown as sleepers in the illustration hereby attached, because the special rolls for these bulb angles do not yet exist.



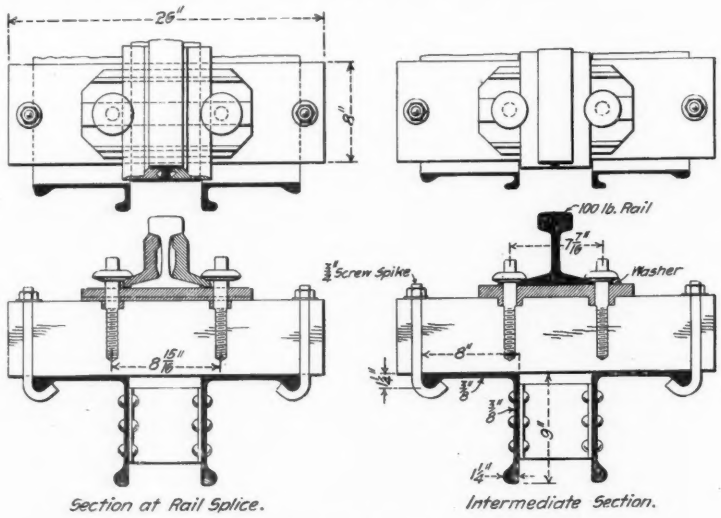
Mr. Lindenthal's Longitudinal Steel Foundation for Railroad Track.

The fundamental objects of the sleeper design are great longitudinal rigidity and reduction in cost of track maintenance under the extra heavy and fast train service on trunk lines.

Longitudinal rigidity on the usual track with cross ties is derived only from the two rails. On the sleeper system it is derived from two rails and four bulb angles. Two bulb angles riveted up as shown form a sleeper.

Longitudinal rigidity is approximately proportional to the moment of inertia of the steel rail. (I)

For a new 90-lb. rail A.S.C.E. section I = 34.0.
For a new 100-lb. rail A.S.C.E. section I = 43.8.
As rails become worn their rigidity decreases.
For two sleepers, each 84 lb. per yard, I, = 173.5.



Longitudinal Steel Foundation for Railroad Track.

Rigidity of one sleeper and one 90-lb. rail I + I, = 207.5, which is six times greater than for the 90-lb. rail and about five times greater than for the 100-lb. rail on the usual cross tie track.

The item of cost for surfacing may be taken as nearly proportional to rigidity of track. It follows that cost of surfacing for sleeper track will be only a fraction of the same item for cross tie track. The experience with experimental track at Pomeroy will probably prove this after the first year.

The weakest part in the cross tie track is at the rail joint. The flange plates or flange angles are exposed to the same bending up and down as the rails themselves. But in addition to the bending stresses, the flange plates must resist large shearing stresses when the wheel load passes from one rail to the other at the sus-

pended joint. The shearing stresses are usually not considered, but they are much more severe upon the flange plates than the bending stresses, and they also cause much more rapid and greater wear at the lines of contact between flange plates and rail.

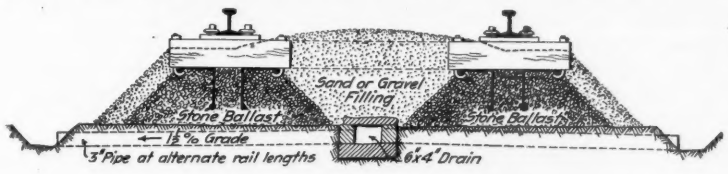
This wear in suspended joints is unpreventable. But if the rail ends are supported on a solid base, then there are no shearing stresses and no wear. A cross tie is not, however, a base of sufficient solidity for such a support, and it does not meet the trouble. But in the sleeper system there is a solid support for the rail joint on the rigid steel sleepers, which distribute the pressure over a long distance and the rail joint therefore gives here no trouble.

The rail track must be so made as to permit raising and surfacing if the ballast or embankment underneath is settling. The steel sleeper system permits of such raising and tamping at a depth of 8 in. below the base of rail, which is the same depth as with wooden cross ties. But the length and amount of tamping with these sleepers is obviously less and more convenient than with cross ties.

In the experimental track at Pomeroy, the surfacing of the track has been found to be difficult, because of the large projecting bottom flange of the temporary sleeper. But this bottom flange does not exist in the regular bulb angle sleepers.

The bearing surface on the ballast of the standard cross tie track, with no allowance for a 2-ft. strip along center of track which is not tamped, is about 28 sq. ft. in a length of 10 ft.; while the bearing surface of the sleeper track is 37 sq. ft. in a length of 10 ft., or 30 per cent. greater. The space between vertical legs of sleeper angles is solidly filled and tamped with finely broken stone, which is thus wedged in like an arch and adds to the bearing width of the sleepers. The full bearing width of each sleeper is thus 22 in.

Perfect drainage is of the first importance in any track. Deep side ditches below the bottom of the stone ballast are essential. In the sleeper system drainage is provided in the manner shown on plan. The deep ditches into which to drain off the water are necessary with any form of good track and represent no additional cost for the sleeper system.



Section of Track.

So that the rail may be used as an electrical conductor for block signaling purposes, the rails rest on creosoted hardwood blocks which act also as a cushion between rail and sleeper. There are gage ties of creosoted hardwood every 6 to 8 ft., which will last 40 and more years. The wear of the rail base into the wooden blocks is prevented by heavy tie plates of a special form, which cannot be displaced nor will they curl up.

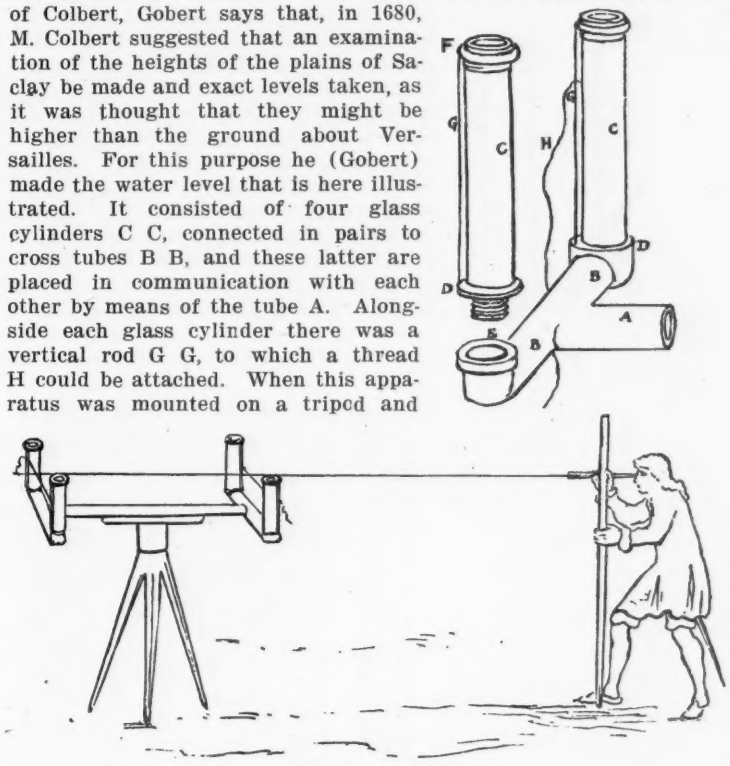
The wear of the rail head on curves can be taken up by washers "A" between screw spike and rail base, as shown on plan. With this arrangement no difference in the track fastening is required for tangents and curves, and there is only one system of fastening with screw spikes for all conditions. There is very little creeping of rails with the sleeper system; the solid bottom support and the strong rail fastenings do not permit the sinuous motion of the rails which occurs on cross tie track and which aids creeping.

The cost at present prices for standard cross tie track with 100-lb. rails and creosoted hardwood ties is about $12,500 per mile. The cost of the sleeper system is estimated at $25,518, or say, $13,000 greater on the basis of $2^3/_{10}$ cents per pound for steel bulb angles. On the attached table are given the items of cost for the steel sleeper track. But when manufactured in large quantities (justifying the expense for special rolls and tools for rapid fabrication), the cost of the bulb angles should not be greater per ton than for steel rails.

The saving in all items of cost for maintenance of sleeper track over cross tie track will probably be $700 per mile, which is 5 per cent. on $14,000 per mile. Therefore, by that much, the cost per mile could economically be greater if it will give a track of greater rigidity and greater safety. If bulb angles of Bessemer steel are no more expensive than Bessemer rails, then the additional cost will hardly exceed $8,000 per mile, and in that case the sleeper system will show a great economy over the cross tie system. It is needless to say that the greater cost of the sleeper system is not justified for any other but heavy traffic.

A Level of the Time of Louis XIV.

Gobert was the engineer who acted most prominently in the construction of the reservoirs and acqueducts connected with the waterworks of that abyss of expense, as Voltaire called it, the park and palace of Versailles. In a report to M. de Blainville, the son of Colbert, Gobert says that, in 1680, M. Colbert suggested that an examination of the heights of the plains of Saclay be made and exact levels taken, as it was thought that they might be higher than the ground about Versailles. For this purpose he (Gobert) made the water level that is here illustrated. It consisted of four glass cylinders C C, connected in pairs to cross tubes B B, and these latter are placed in communication with each other by means of the tube A. Alongside each glass cylinder there was a vertical rod G G, to which a thread H could be attached. When this apparatus was mounted on a tripod and partially filled with water, the latter would stand at the same height in all four of the tubes. Then by stretching the threads across from one water level to the other two perfectly horizontal lines of the same height were obtained. By taking a glass and sighting past these two threads, as indicated in the illustration, a level could be run. Comment upon the speed with which work could be done with such an instrument is unnecessary, and the wonder is that undertakings of such magnitude as that of the Versailles water works could be executed with instruments of such primitive form.—*Revue de Mecanique.*



Gobert's Level.

A—Main pipe.
B—Cross pipe.
C—Clear glass cylinders.
D—Copper ferrules attached to the elbow, E, with copper gaskets.
F—Ferrules at the top of cylinder, to which the rods, G, are attached.

Longitudinal Steel Foundation for Railroad Track—Schedule of Material.

Items. Dimensions.	No. of pieces per 1,000 ft.	Weight of each, pcs in lbs.	Weight (tons), per 1,000 ft. Gross.	Net.	Prices. Gross ton.	Lbs.	Cost of single track. Per lin. ft.	Per 1,000 ft.	Per mile.
Rails (A. S. C. E., 100 lbs.) ....33 ft. long.	60.6	1,100.0	29.76	....	$28.00	....	$0.83	$833.28	$4,399.92
Splice bars .....34 in. long.	128	42.4	.....	2.71	.....	1.75c.	.095	94.98	501.49
Splice bolts .....1 in. diam., 5¾ in. long.	378	1.70	.....	.32	.....	2.90c.	.019	18.63	100.32
Nut locks	378	.....	.....	....	.....	1.2c. each.	.0045	4.54	21.12
Together	.....	.....	.....	....	.....	.....	.....	$951.43	$5,022.85
Intermediate tieplate .....12½ x 7 x 5/16 in. thick.	970	11.65	.....	5.65	.....	2.00c.	$0.230	$226.01	$1,214.40
Tieplate at rail joint .....12½ x 7 x 5/16 in. thick.	62	11.65	.....	.36	.....	2.00c.	.144	14.45	83.40
Washer "A" .....1 11/16 x 1 11/16 x 5/32 in.	1,940	.128	.....	.12	.....	2.00c.	.005	4.93	26.40
Screw spikes .....1 1/16 x 6½ in. long.	2,068	3.16	.....	3.26	.....	2.90c.	.189	189.51	997.92
Together	.....	.....	.....	....	.....	.....	.....	$434.90	$1,322.12
					Per M.				
Rail blks. (creostd wh.o. or y.p.).8 x 6 x 26 in. long.	790	6,857*	.....	....	$30.00	.....	$0.206	$205.71	$1,087.68
Cross-ties (creostd wh.o. or y.p.) .8x6 in. x 7 ft. 2 in. long.	362	10,382*	.....	....	30.00	.....	.311	311.46	1,652.08
Hook bolts. .....¾ x 11½ in. long.	2,068	1.47	.....	1.57	.....	2.90c.	.088	88.16	464.66
St'l fndatn (splices & separators) .Bulb angles 8 x 9 in.	60.6	2,034	.....	61.6	.....	2.30c.	2.835	2,834.99	14,968.80
Together	.....	.....	.....	....	.....	.....	.....	$3,440.32	$18,173.22
Total	.....	.....	.....	....	.....	.....	.....	$4,826.65	$25,518.19

*Per 1,000 ft. B. M. NOTES.—For comparison of costs it is fair to compare the sum of the last four of the above items ($3,440 for 1,000 ft. of track) with cost of creosoted ties (at $1.65 per tie) or $990 for 1,000 ft. of ordinary track. The difference for 1,000 ft. is $2,450; for 1 mile is $12,936. The costs of labor for both kinds of track are assumed to be the same. The cost of drainage pipe for the track with longitudinal steel foundation is $0.034 per lin. ft. of track. This item is compensated by the saving in the quantity of stone ballast.

Method of Placing Heavy Double-Track Through Plate Girders on the Union Pacific.

In second track construction necessitated by growth of traffic, it is something of a problem to replace, under traffic, the existing single-track girder bridges with the required double-track structures, with a minimum delay to trains. The difficulty of the problem is in direct proportion to the intervals between trains, and these are of necessity short, since it is the too great frequency of trains that has imposed the change. To find an interval of as much as an hour is often not easy, therefore the method used for the bridge substitution must be as simple, efficient and expeditious as possible.

The usual method for single-track through plate girders, of course, is to erect the structure complete at one side and pull it into place on a greased rail by means of tackle worked by hoisting engines at a convenient point. But where this method is used with heavy double-track through plate girder spans, there is a tendency for the girders to cut into the rails, requiring considerable power to move the structure; also, the latter has a tendency to see-saw—that is, one end may move by jerks and the other end remain practically stationary, or move forward steadily;

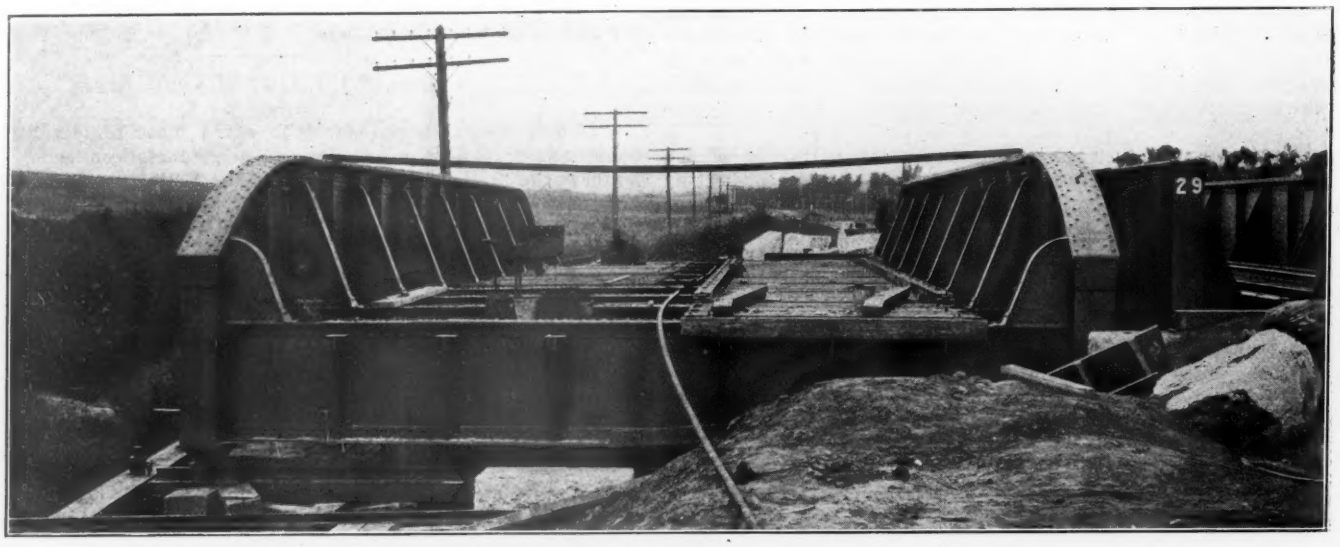


Fig. 1—80-ft. Double Track Girder Span Ready to be Pulled Into Place.

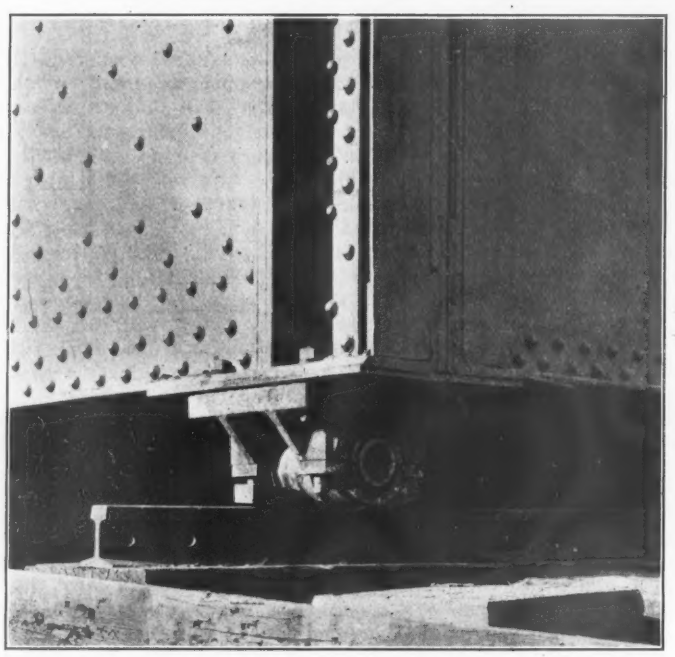


Fig. 2—Dolly in Place Under Corner of Girder.

furthermore, there is a tendency for the girder to move past the position desired, and as no tackle is provided for pulling it in the opposite direction, considerable jacking may have to be done finally to get the bridge located properly.

The Union Pacific Railroad had a number of 80-ft. single-track through plate girders to be replaced with double-track spans of the same length, each weighing 270,000 lbs. net. In view of the objections to the old method of placing these structures outlined

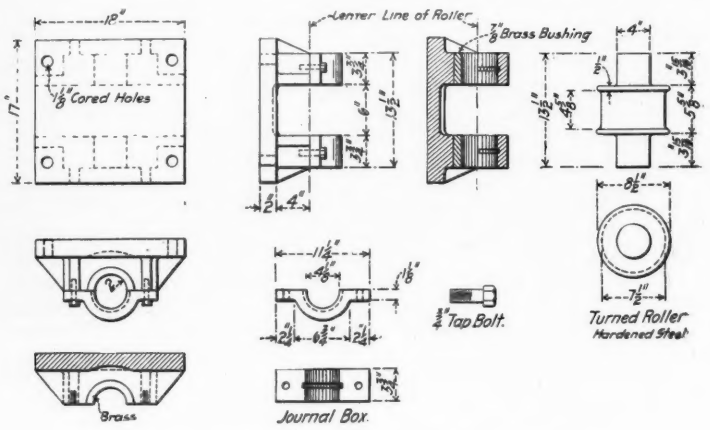


Fig. 4—Details of Bridge Erecting Dolly.

Fig. 3—New Span in Place; Old Single Track Girder Pulled Out to One Side.

in the previous paragraph, a modification of same was utilized. It was simply the substitution of rolling for sliding friction by the interposition of a suitable heavy dolly under each corner of the bridge. By this method the new span is hauled into place with approximately the same power as is required to slide out the old single-track span on a greased rail. The movement of the structure is uniform, both ends moving at the same rate, and there is no tendency to skew or see-saw. Also, there is no danger of overrunning the desired location, nor is there any tendency for the bridge to jam against the back walls of the abutments.

The time of making the change, including cutting the track, pulling out the old span and substituting the new one, and spiking the track in place again, is not over an hour. The scheme was devised by Mr. James Keys, Bridge Engineer of the Union Pacific, and the dollies were made at the Omaha shops. The castings are iron with about 20 per cent. of steel added. The rollers were turned from a scrapped 9-in. locomotive axle. The total weight of a dolly is about 450 lbs. and the cost about $20.

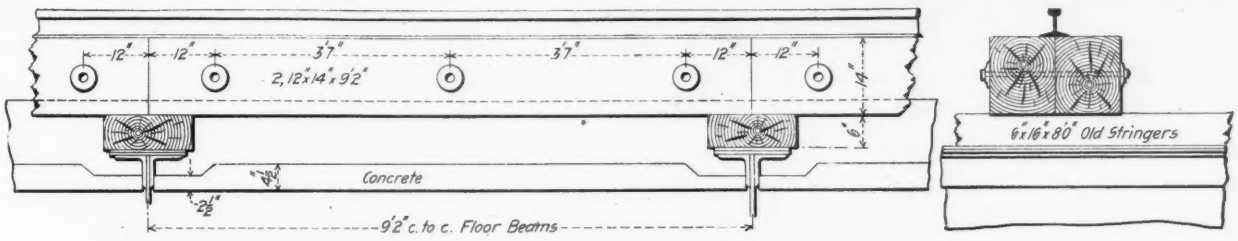
Reinforced Concrete Floors for Through Truss Spans.

The Chicago, Burlington & Quincy first began the use of reinforced concrete solid floors for bridges about three years ago, the first design being for deck girders. The application was later extended to through girders, and more recently to through trusses. Applications of the latter sort have been made on bridges on the lines out of Kansas City and St. Louis north, and designs are now in preparation for other spans.

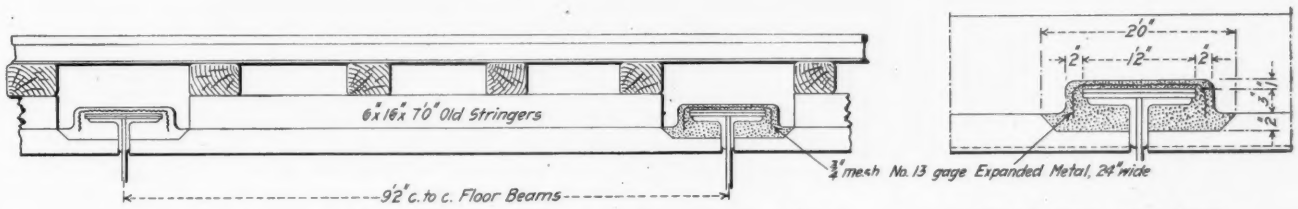
The floor is designed to be built in place, under traffic, on bridges already in service as well as on new structures, the detail drawings herewith showing how the former is accomplished. The cross ties are removed and the rails laid on stringers composed of two 12-in. x 14-in. pieces bolted together. These stringers rest on 6-in. x 16-in. transverse timbers laid on top of the floor-beams, the total temporary raise of grade being about 11 in. The track is held to gage by transverse tie rods between stringers, not shown in the drawings. This arrangement enables the slabs to be built between floor-beams to the form indicated in the detail. It will be noted that the thickness of the slab is reduced from 4½ in. to 2½ in. at the edges adjacent to the floor-beams to provide space for the beam covering. When the slabs have hardened sufficiently the heavy timber stringers are removed and 6-in. x 16-in. pieces 7 ft. long laid longitudinally on the concrete slabs, and track ties inserted, resting on these pieces. The floor is then completed over the floor-beams, as shown in the detail of the section across floor-beam. The deck is covered with ¾ in. of asphalt before placing the ballast. The latter is 6 in. deep under the ties.

The slabs are made of 1:2:4 concrete and have a uniform thickness of 4½ in., except over the stringers and at the ends, as above noted. The parapets are 8 in. thick and 16½ in. high. The reinforcing ½-in. corrugated bars are spaced 3 in. apart longitudinally of the bridge and 12 in. apart transversely, with three additional longitudinal rods in each parapet, as shown. The floor rests on eight stringers, the outer ones carrying the parapets and providing

Brush Creek Bridge, with Reinforced Concrete Floor.

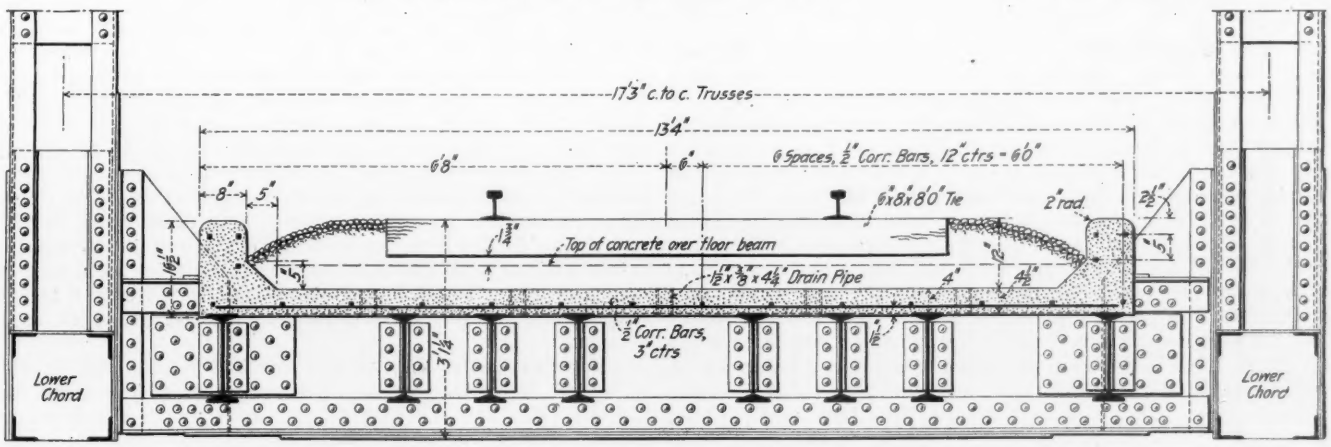


Method of Supporting Track During Construction of Floor Slabs.



Method of Supporting Track During Construction of Floor

Section Across Floor Beam.



Details of the Reinforced Concrete Floor of the Burlington's Brush Creek Bridge.

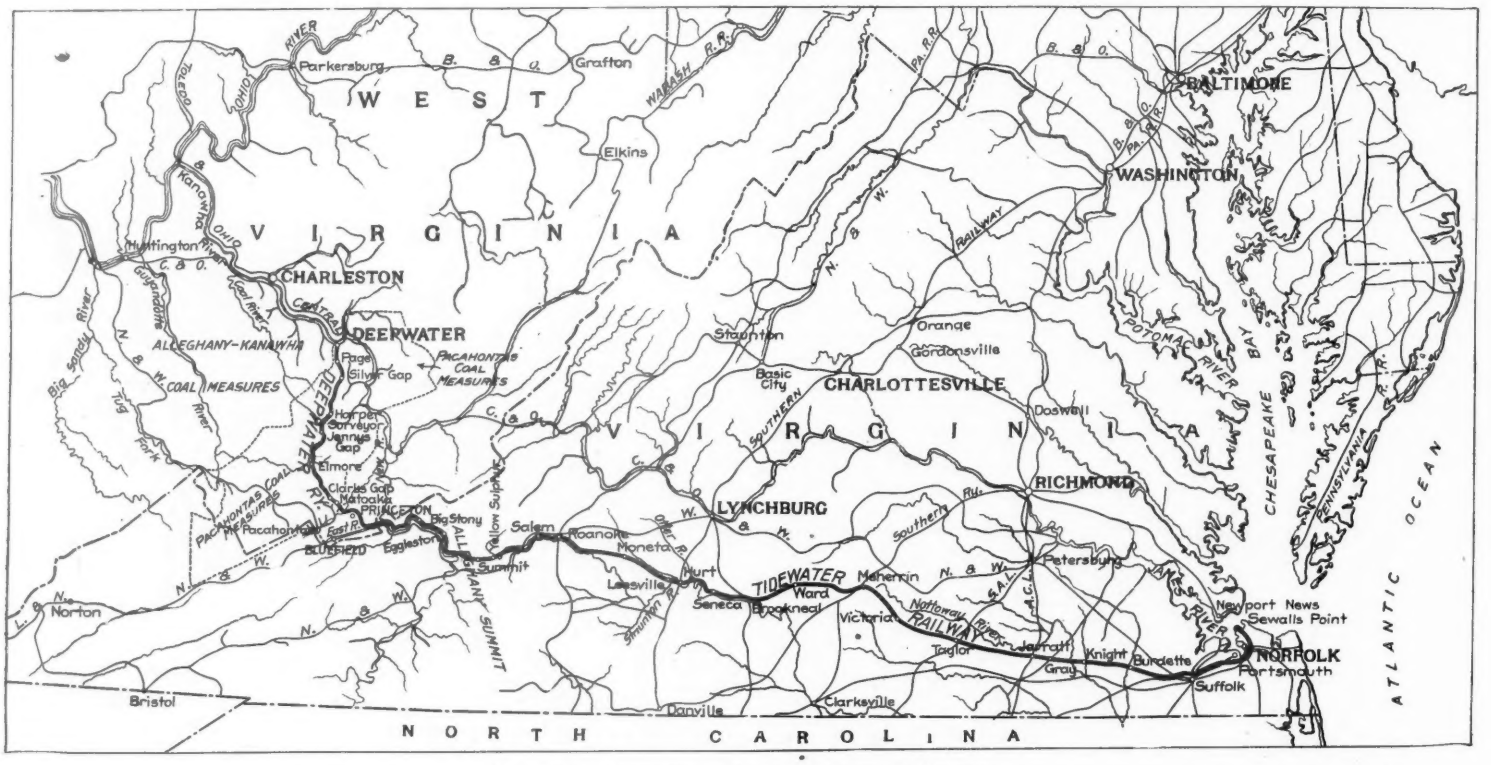
support in case of derailment. It will be noticed that the parapets are built over the floor-beam gusset plates and the necessary section of concrete provided by heavy fillets on the inside of the parapets. Drain pipes made of old boiler tube or gas pipe, 1½ in. in diameter, are placed five in a row across the floor, three rows to the slab. The deck with track and ballast complete weighs 2,500 lbs. per lineal ft. of single track and the cost is about $5 a foot.

To build the floors under traffic is pretty difficult work, of course, and takes considerable more time than with a new bridge; but once in place, they require no further attention and cost nothing for maintenance. We are indebted to Mr. C. H. Cartlidge, Bridge Engineer of the Burlington, for data for the foregoing.

The Tidewater and the Deepwater Railways.

GENERAL FEATURES.

It is well-known that West Virginia is one of the richest states of the Union in the extent and variety of its mineral deposits and that among the clay, shale, silica and limestone beds with which it abounds coal stands supreme as the product upon which the wealth of the state and the traffic of its railroads chiefly depend. Roughly speaking the coal fields have an extent of from 10,000 to 12,000 square miles of workable territory, and the deposits may be as roughly grouped into the Pocahontas, Kanawha and Pittsburg



Map of Tidewater and Deepwater Railways.

measures. These measures have a general dip to the southwest at the rate of from 30 ft. to 75 ft. to the mile, with the Pocahontas measures the lowest. This Pocahontas coal belongs to the same period as the Pottsville coals of Pennsylvania, and as a steam coal is acknowledged to be unequaled. An approximate analysis of the seam may be taken as:

Fixed carbon	77.0	Moisture	0.4
Volatile matter	16.1		
Ash	6.0		100.0
Sulphur	0.5		

And it is an approximation to this high quality that an attempt is made to reach in the mixture of the anthracites and soft coals for the cheaper steam fuels used in the eastern markets.

These Pocahontas measures lie along the eastern extremity of the state and end in a fault beyond which no coal of importance is found. This line of demarkation is very distinctly marked as shown on the map of the Tidewater-Deepwater Railways. The field itself has a width of about 30 miles and runs from the northeast to southwest. To the west is the Kanawha field ranging in width from 10 to 50 miles. At the present time this great coalfield is crossed by three railroads, the Baltimore & Ohio, the Chesapeake & Ohio and the Norfolk & Western, of which only the two latter touch the Pocahontas measures, and these, at their points of entry on the eastern edge, are about 40 miles apart; the Chesapeake & Ohio coming in with the New river, and the Norfolk & Western further south near the headwaters of the Bluestone river, which flows in a northeasterly direction nearly parallel to the great Pocahontas fault already alluded to. These roads approach each other with branch lines that run as spurs to the north and south in the coal territory, but even with these there is a wide area of this exceedingly rich and productive property that is not reached. Even that already opened is not only taxing the present capacities of the railroads by which it is served to the utmost, but it is capable of a far wider and more extended development, and in this the Tidewater and Deepwater Railways are intended to assist.

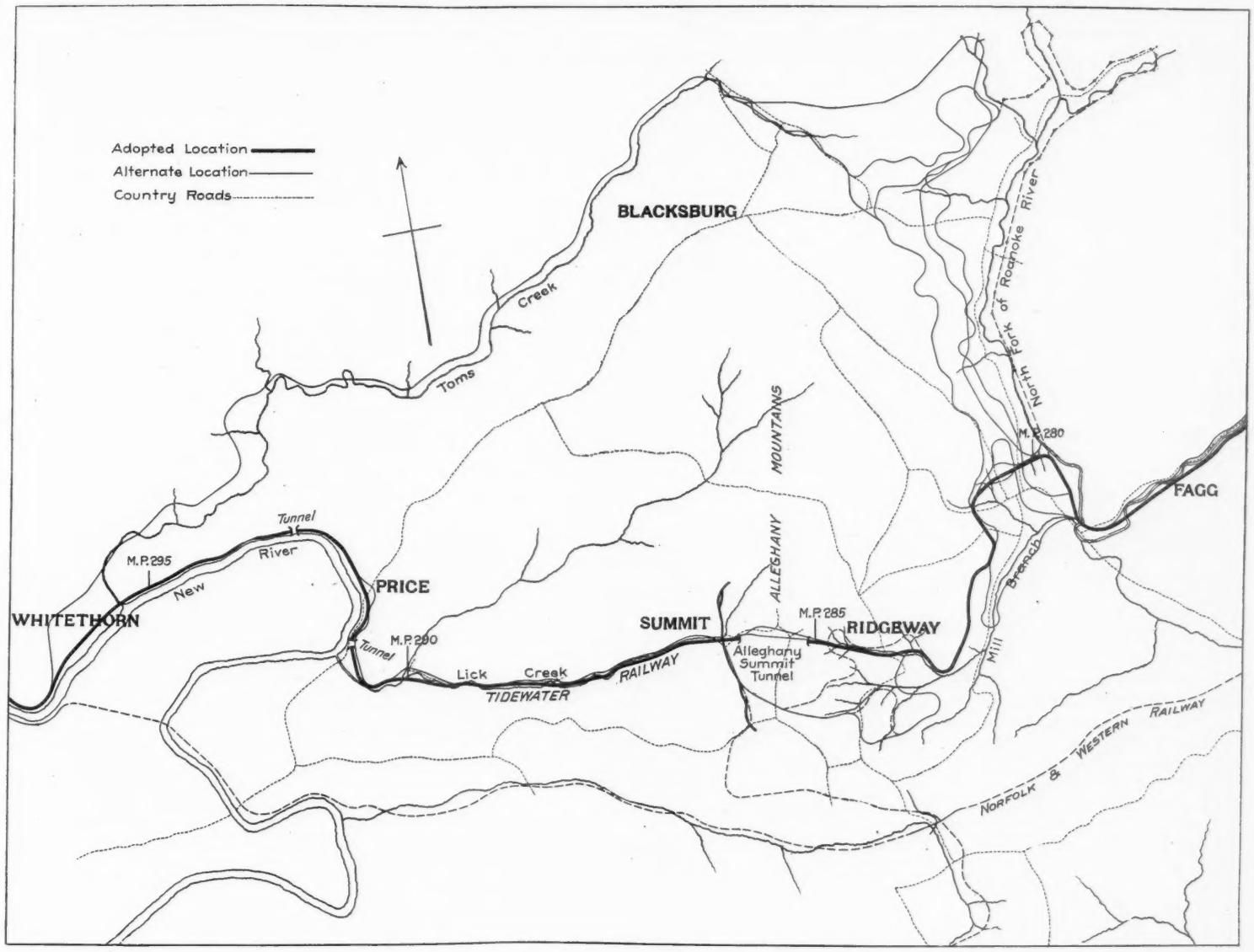
Started originally as a spur of the Chesapeake & Ohio Railroad at Deepwater, West Virginia, at the head of navigation of the Kanawha river, but under an independent ownership, and intended primarily to serve the lumber interests of the region, the scheme has been developed until it has come to fruition in the building of a road from Deepwater in the heart of the West Virginia mountains to Tidewater at Norfolk, Va. Although incorporated separately as the Deepwater Railway of West Virginia and the Tidewater Railway of Virginia, the two are being built together by one management and will be operated as a single line of road. They are to be consolidated as the Virginia Railway incorporated this month in Virginia. They are being built for the express purpose of reaching and marketing what will be the products of about 150,000 acres of coal land in the Pocahontas field that have not as yet been touched. In the execution of this project it was decided that after the line escaped from the fastnesses of the West Virginia mountains and emerged into the comparatively open country of Virginia that it should be constructed with a maximum grade of .2 per cent. compensated against eastbound traffic and .6 per cent. compensated against the westbound. With these conditions rigidly adhered to, it will be possible for a single locomotive, such as will be used, to haul a train of 80 loaded cars of 100,000 lbs. capacity from the assembling yard at the edge of the coal fields to tidewater, except in the two cases of mountain climbing where pusher grades will be used, and return with a train of equal length of empties. In passing through the mountains these limitations have been removed, and while heavy work has not been avoided and the line is a remarkable one, both in profile and alinement, the nature of the country through which it passes has necessitated steeper grades. The Deepwater section of the line will, therefore, serve as an originating portion and cars will be hauled from the mines to a general assembling and classification yard at Princeton, W. Va., for arrangement and distribution.

When the character of the country is understood, not only in the mountainous portion covered by the coal fields, but the rolling lands of Virginia as the elevations drop down from the Blueridge mountains to the sea, as well as the space intervening between the Blueridge and the Alleghanies, it will be seen that the construction of such a line as that outlined is not only a task of great magnitude, but one calling for the highest grade of engineering skill.

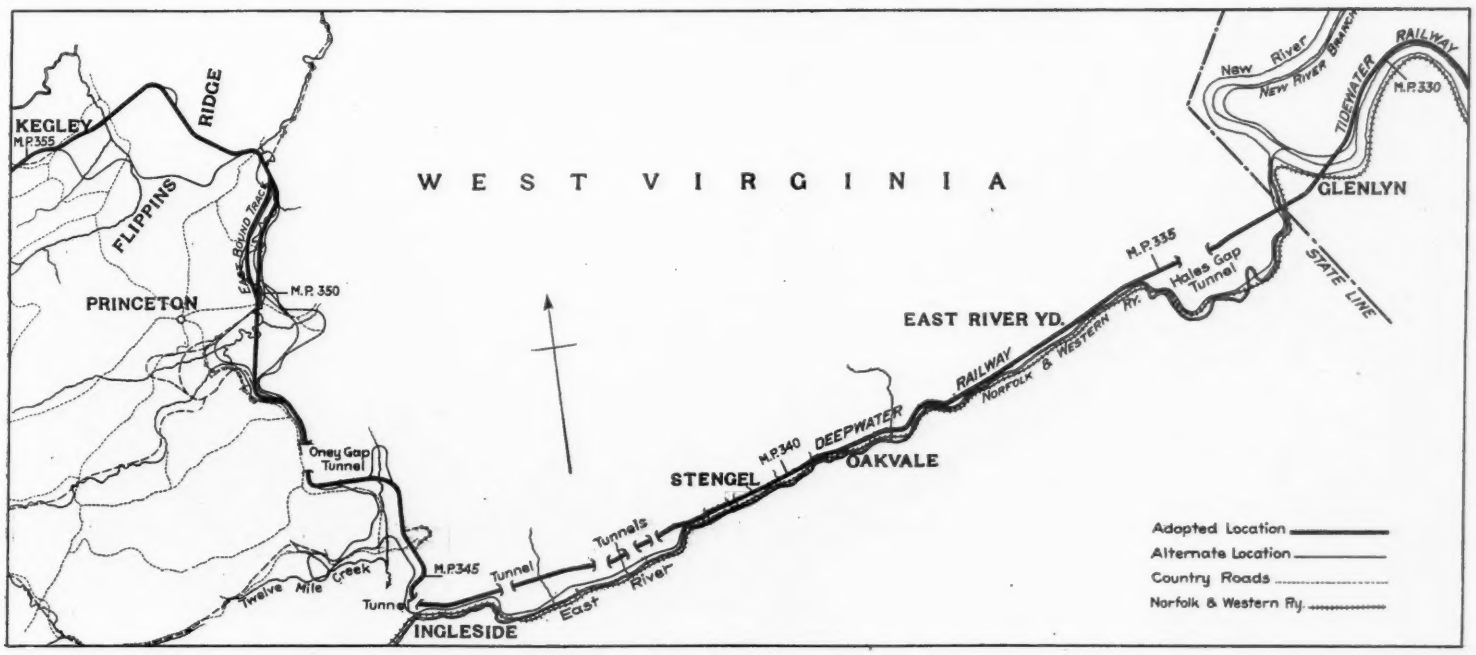
The alinement and profile vouch for this and to this must be added the willingness of the promoters of the work to sustain the engineers and management, not only in the surveying and location of such a line as had been determined upon, but in constructing it in the best possible way and in accordance with standards

that represent the most advanced and thorough conditions of railroad building and operation. In this, bold and extensive works in the form of tunnels, cuts, fills and bridges have been required all along the line, and their execution was naturally preceded by extensive surveys that covered practically the whole state of Virginia south of the James river. In this territory four distinct locations were made with estimates of cost before the final decision was reached. This was for actual work in the field to say nothing of the studies and tentative routes that were made from the topographical maps published by the United States Geological Survey. It may be stated here, as illustrative of the methods used, that throughout the whole of the preliminary work of the surveys these maps were in constant use and served as the basis for the plotting of the general run of the lines before parties were put in the field. They even served to furnish information from which general estimates could be made, and thus avoided the expense of useless reconnaissance or preliminary work that had no chance of success.

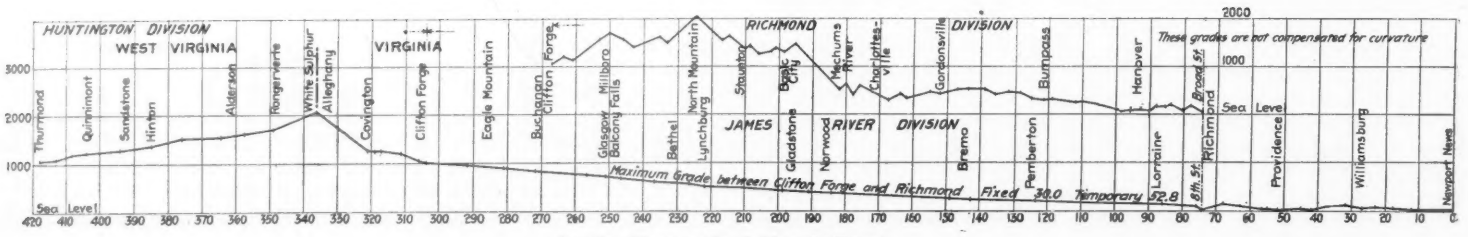
One of the characteristic features of this road, and one which



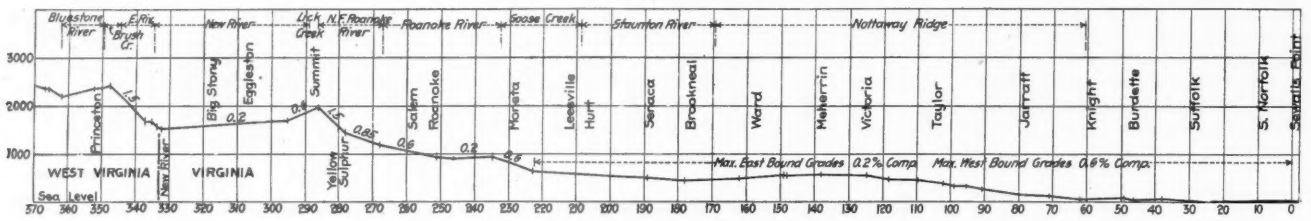
Locations Across Allegheny Mountains; Tidewater Railway.



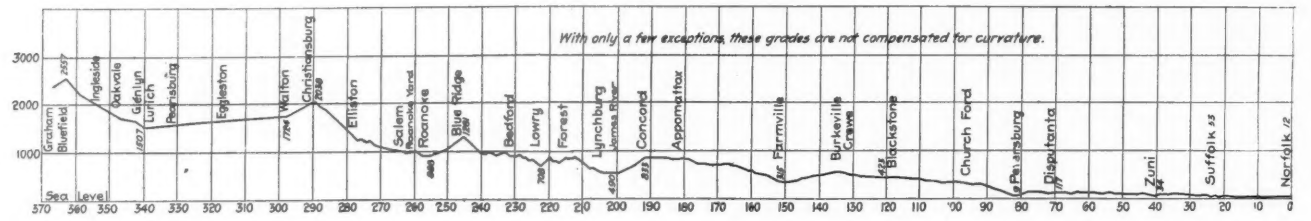
Locations of Deepwater Railway from Princeton to New River.



Profile, Chesapeake & Ohio Railroad.

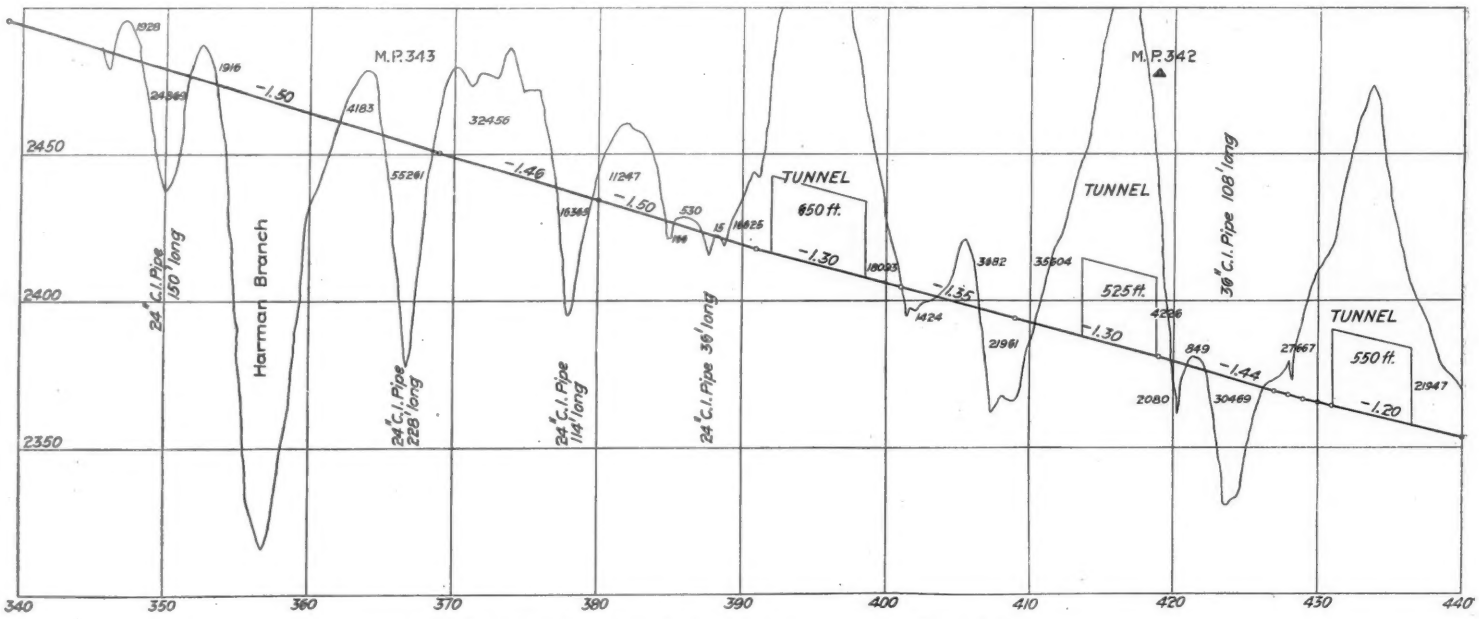


Profile, Norfolk & Western.

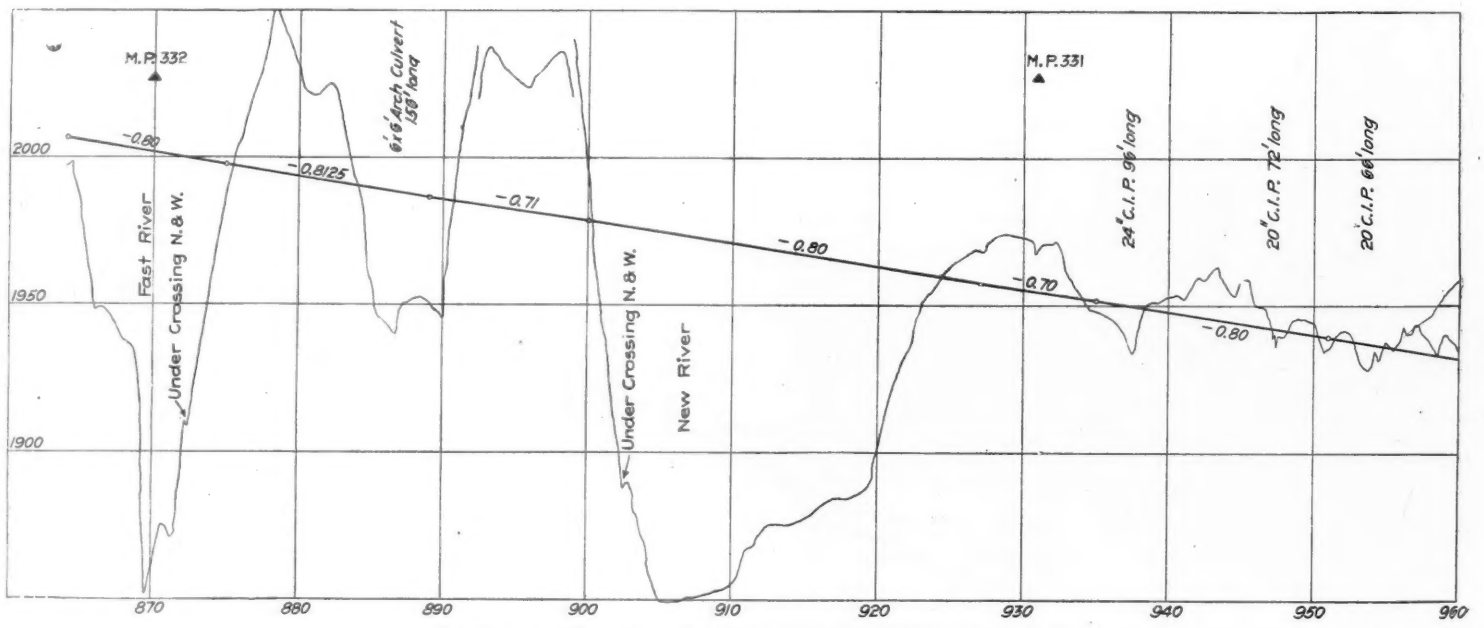


Profile, Tidewater and Deepwater Railways.

Profile of Coal Roads from West Virginia to the Sea.



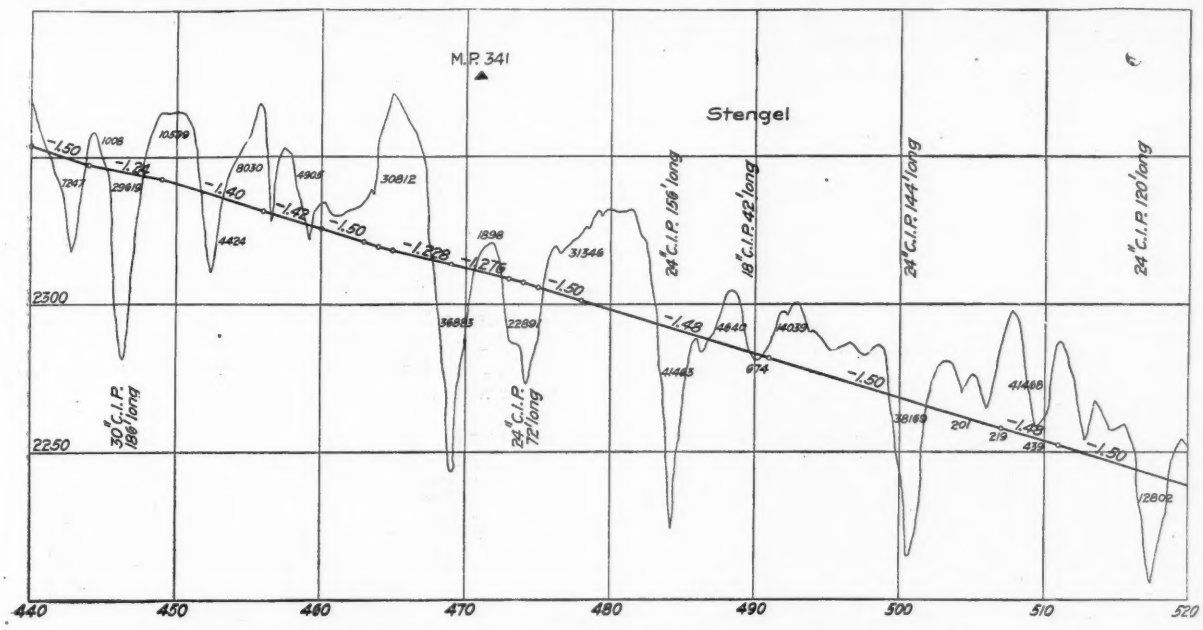
Profile of Tidewater Railway, Approaching East River.



Profile of Tidewater Railway at New River Crossing.

Heavy Cut at Mile Post 83; Deepwater Railway.

is merely indicative of the thoroughness and masterly manner in which all of the work has been done, is that in which the surveys have been conducted. Aside from the general rough character of the country, and the necessity of working a low-grade line with a maximum of .2 per cent. adverse grade from the mountains of West Virginia, there was placed upon the engineering department the duty of laying out the best line that the country afforded. Ordinarily the directors of a piece of line of this kind dictate the details to a greater or less extent; they insist very properly that the towns and villages adjacent to the route shall be reached on account of the immediate traffic which they will afford, and the desire to meet the demands of the public for a convenient and expeditious service. In this case, however, no such lines were laid down. The engineers were simply given two terminals, and told to connect them by a line of the exceedingly low grade specified, and by the shortest and best route that the country afforded. They were not hampered by the needs of reaching a single city or village en route and were given the whole width of the state of Virginia in which to locate the line. While this free hand placed the whole responsibility for the economical location and construction, as well as its subsequent operation, on the shoulders of the chief engineer, and showed in the most marked degree the confidence placed on his department, it added greatly to the work, in that it involved the examination of a much wider belt of territory, not only in reconnaissance and preliminary surveys, but in actual location of alternative lines than would have otherwise been required. It involved also a much heavier expenditure for surveys than would have been incurred under ordinary conditions where, from the necessity of reaching certain definite points, the belt to be examined and surveyed would be much narrower. This is undoubtedly the proper and scientific method of railroad location, and the results in this case seem to have fully justified the elaborateness of the preparation, but unfortunately it is not one that is often permitted either by commercial or operative conditions, to say nothing of the desire on the part of the directors to direct details and their haste to have some tangible results to show in the nature of construction in progress.



Profile of Tidewater Railway, Approaching East River.

Cut Between East River and Hales' Gap Tunnel; Deepwater Railway.

The nature of the line to be built and the country through which it passes involves continuously heavy work from the start at Deepwater until the level country west of Norfolk is reached.

At the start it is difficult to conceive of a rougher or more unpromising territory in which to build a railroad than the mountain country of West Virginia, through which this road runs from Deepwater to Princeton, a distance of about 95 miles. The mountains are precipitous ridges, true Sierras, saw tooth in section, and the valleys are narrow and tortuous, with little or no arable bottom land, and each carrying a rapid mountain stream of dimensions varying with the season, the amount of immediate rainfall and the area drained. Location here leaves but two courses open; one to follow every bend of the stream, and the other to cut across and work on tangents. The first puts in a road that is full of curves, in fact consists of little else, and the other becomes a mere succession of bridges and tunnels. The first involves the lower first cost, but the higher expense for operation, so that there is usually a compromise between the two, and bridges and tunnels are used where it appears that the saving in cost of operation on the prospective tonnage will warrant the increased original expenditure.

When the first five miles were laid out south from Deepwater in 1894, it was the intention to extend the road eventually down through the coal regions between that point and Princeton, but it was not expected that it would ever develop into a through tidewater line. It was intended merely as a spur tributary to the Chesapeake & Ohio, and reached down to some lumber operations in the neighborhood of Robson. The location was, therefore, made along the banks of Loup creek, a tributary of the Kanawha river at Deepwater, and followed it in all its sinuosities. The idea seemed to have been to get into this territory with a minimum of original outlay, so that we have curves of 16 deg. in abundance while the grade follows that of the fall of the stream and rises 234 ft. in 21,000 ft., or on an average of uncompensated grade of a little more than 1.1 per cent., though for the first 9,000 ft. the rise is continuous at 1.5 or 1.7 per cent. On this section the profile shows

the selection of a route of minimum excavation, there being but a few heavy cuttings. This was the condition of this nest egg of this present line at the end of October, 1903.

In the meantime surveys had been undertaken for the extension of the line up into the coal fields, but without the expressed intention, at the time, of running on to tidewater. The work was, however, done in a way to somewhat modify the severity of the line already built in that the maximum rate of curvature was reduced and the grade cut down as far as practicable. Consequently immediately after leaving the end of the original line we find the alinement much straighter and the grades against the south or eastbound movement lighter.

With the exception of a tunnel 290 ft. long at station 264, there is little heavy work encountered until Hamilton is passed, about

Rock Ballast Quarries at Surveyor, W. Va.; Deepwater Railway.

11 miles from Deepwater. Then beyond that point there are a succession of heavy cuts and fills with one trestle 60 ft. high. This is on the maximum grade in this portion of the line up to Silver Gap which is turned at an elevation of about 1,850 ft. The line then follows the banks of Mossy creek on a modified grade and about the same class of alinement as before with a continuous succession of rather heavy work. This down grade continues to Lively (24 miles), and in this section there is a trestle 90 ft. high and two tunnels, one of 950 ft. and the other of 300 ft., besides two trestles lower and smaller than the one mentioned.

Again at Lively there is a reversal of the grade with a rise along Paint creek to Harper, on still easier grades, and it is on this section that the two highest trestles so far on the line are found, each about 110 ft. high. At this point the line, as finally located, skirts along the edge of the Flat Top mountain, which is about the only ground in this territory that can be considered at all easy and not set on edge. Unfortunately it was impossible to take any advantage of these conditions, on account of the general trend of the road, which it was necessary to hold. The line, therefore, bends away to the southwest and follows the water course that drops away quite rapidly. It does this running down one branch until a tributary is reached, which is followed up to the dividing ridge, which is crossed in a cut or tunnel, thus forming a rather steeply undulating line to Mullens, 58 miles from Deepwater, situated just above the junction of the Slab Fork and Guyandot rivers. In this section the grading becomes lighter, but the country is exceedingly rough. There is, however, some tunneling.

Mullens is now the head of travel, though the rails are laid for some miles further. One mixed passenger and freight train is run daily between Deepwater and Mullens, and these serve to bring in contractors' supplies and other requirements.

The exceedingly wild and picturesque country continues for 15 miles further on up to Clark's Gap, which is crossed by a 1,200-ft. tunnel. In this distance there are a number of long and high viaducts, all of which are steel of the approved standard designs. Some of them are finished and the grading all done. In this the heaviest work is found of any south of Deepwater.

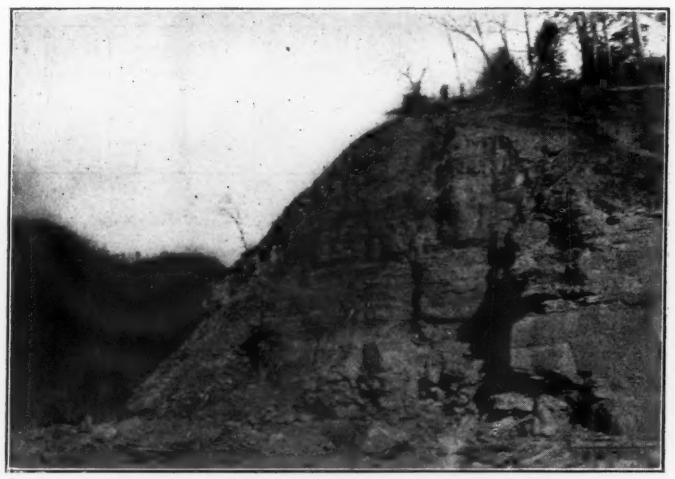
The line, as thus laid out, is an example of high grade work through an exceedingly rough and difficult country, but it must not be thought that the final location was coincident with the only preliminary run. It has been the policy throughout the whole distance from Deepwater to Norfolk to make a broad general study along both sides of the suggested line in order to locate on the best that the country affords. Accordingly the same policy was pursued in this difficult West Virginia country.

Up to Silver Gap summit there apparently seemed to be but one route to be followed and little was done on either side of the line. But on leaving this summit the road strikes into the true Pocahontas coal territory that it is intended to serve, and it became advisable to study the country thoroughly. In order to fully appreciate the necessity for this it is necessary to bear in mind not only the saw tooth nature of the country but also the fact that this very contour, with its innumerable and tortuous hollows or valleys, necessitates the placing of the coal operations upon what would otherwise appear inaccessible heights and locations. Consequently a road to efficiently serve such a country and take care of the traffic that will come when it is developed, must be prepared to reach out-of-the-way and remote places either by its main line or spurs. Hence the necessity, not only for reconnaissance but for the running of preliminaries that it is not expected to build at once, and even for the location of a number of alternate routes. This was done, in the territory under consideration, just as it was done in the more open Virginia country, and lines have consequently been located up and down the hollows leading off the main line all the way from Silver to Clark's Gap. In fact, surveys and location were made for an alternate line to the east of the one adopted, all the way from Silver Gap to the Bluestone river, at a point approximately the same distance from the starting point as the one by way of Clark's Gap. This covers a territory approximately 20 miles wide in places and reaching out into those exceedingly rich mining properties on Dunloup, Piney and Laurel creeks. This would have been a very heavy piece of line to construct and in one place a loop with an approximate diameter of about 3,000 ft. was provided for.

While these lines will not be built, except as spurs to reach operations that may possibly be opened in the future, the fact that they were run and all the data for them obtained enabled the engineers to select the route that they did, which may be considered to be the best that the country affords.

After leaving Clark's Gap there is a drop in the profile in heavy work all the way down to Matoaka, 80 miles from Deepwater. Between this point and Princeton, 350 miles from Norfolk, the territory explored was again widened and careful comparisons made for the best line. The work here is exceedingly heavy, and it is at Rock (361 miles from Norfolk) that the true main line with its easy gradients may be said to begin. The line rises out of Rock on a .5 per cent. compensated grade and there is then a constant succession of heavy cuts and fills for the 10 miles to Princeton. In this distance the cuts vary in depth from 10 ft. to 80 ft., and there is also the highest viaduct on the line with a height of 190 ft. And so Princeton is reached.

Princeton is to be the gathering point of the coal traffic, and, from this point on, the easy grades and moderate curvature that has been established for the main line will prevail. The country to the north on the Deepwater line is the roughest on the whole route and lies through the West Virginia coal measures. The material to be moved consists of a soft sticky red clay that is treacherous and apt to slide and wash down in the cuts. This overlies,

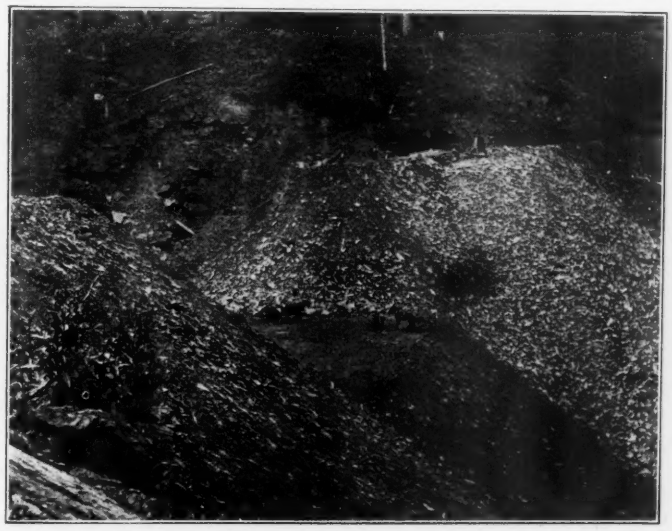


Disintegrated Rock in Elmore Cut; Deepwater Railway.

to varying depths of from 5 ft. to 40 ft., the true coal measure and rock. This and the coal has a dip to the southwest, and is of a friable nature. It is a soft sandstone that crumbles away easily and is readily broken. It is too hard to cut with a shovel, but a blast shot in it breaks it up badly and develops innumerable fissures, utterly disintegrating the rock and throwing it down in a mass without setting out any very large pieces. It can be rapidly drilled and, with the debris and loose fragments removed after a blast, it will stand well but with a constant flaking off of the surface after the manner of a shale which it closely resembles in places.

Leaving Princeton, the road rises for 2.5 miles on a maximum of .6 per cent. grade to Oney Gap, where the summit occurs in a 1,600-ft. tunnel at an elevation of 2,800 ft. above tidewater. From this there is a rapid drop with a maximum grade of 1.50 per cent. compensated for about 10

miles to the East river. From Princeton to East river the east and westbound grades are pusher grades. The road has now left the coal measures to the north and west and enters on the blue limestone country of the New river district, and at Ingleside is on the opposite side of the East river from the Norfolk & Western, but at a considerably higher elevation. Alternate surveys and locations had been made through all this country, in some of which the curvature was excessive, as must necessarily be the case wherever the natural contour of the ground is followed as shown on the detail maps. But the way was heavy and the demand for low grades imperative, so between Ingleside at milepost 345, and the crossing of the New river at 331, there is some very bold and heavy work. What it



Partly Finished Fill at Micajah Gap; Deepwater Railway.

meant to build this practically straight line of 10 miles, with heavy rock cuttings, fine tunnels and a 2,100-ft. bridge, can best be appreciated from an examination of the sections of the profile shown. Set well up on the hillside, and crossing the flow of the streams into the East river at right angles there is a constant succession of steep rise and fall of the surface of the ground. And it is here that the most spectacular piece of work on the line is to be found.

Coming down the East river, the first location followed the bank of the stream below milepost 335, as shown by the light line, and on the same side but well above the Norfolk & Western. The excessive curvature, the difficulty of construction and the expense involved in doing the work so as not to interfere with the traffic of the other road, led to a radical revision of the location. As first laid out the road would have followed the East river to its mouth and then swung across the New river at an elevation of about 45 ft. on a bridge carrying a 6-deg. curve after which it would have followed up the right bank. Induced by these considerations of location and difficulty of constructing close to the line of another road in rock work that was apt to slide, together with the excessive amount of curvature and the natural objections to crossing a broad river on a sharp curve, the engineers took the bold step of leaving the East river at milepost 335, and running almost on a tangent to the bluff on the up-stream side of the two rivers, and then by holding diagonally across the New river, strike the face of the bluff on the bend beyond by means of a 2,100-ft. bridge at an elevation of 115 ft. above low water and on a tangent for the whole distance. Certainly this is one of the boldest grapplings of a difficult problem that is recorded, and required courage not only to propose but to finance. But in its completed form it will stand as a piece of engineering work justifiable and pre-eminently fine.

The next 40 miles follows the course of the New river, whose fall is approximately that of the limiting grade or .2 per cent. This grade is compensated on curves so that frequently the actual rise is not more than 5 ft. to the mile. In this 60 miles the maximum curvature is 6 deg. except for three short curves of 8 deg. each. There is a gradual rise until at Whitethorne, 295 miles from Norfolk, the road leaves the New river and commences the serious business of crossing the Alleghanies.

In this run from milepost 330 to 290 the proper route was along the river, but for the passage of the mountains the policy of extensive surveys of alternate lines was resumed and a large number of alternatives were run and located, as shown by the fine lines on the engraving, and these were studied in all of their features with the result that the line being built was selected. This gives a practically straight run from the foot of the mountain to the summit up Lick Creek hollow, a distance of about 10 miles, in which the rise is 265 ft. with a maximum compensated grade of .6 per cent.

Throughout this division up the New river and to the crest of the Alleghanies the cutting is all in rock. The material is a hard sandstone, sometimes alternating with a limestone, for it is along New river that the limestones are first encountered. It is hard and offers a heavy resistance to the drills and stands well, but is apt to be seamy and contain pockets and fissures of clay that may come down with almost no warning. It is the material found directly east of the fault in the Pocahontas coal measures, and extends from that point to the Alleghanies which form a dividing line between the sand and limestones, the former being to the west and the latter to the east. This passage of the Alleghanies with a line built within the limits of the grade and curvature that has been imposed was one of the most serious tasks imposed, and required the expenditure of much time and labor in which a number of alternative lines were located as indicated on the map.

Passing Summit at an elevation of 1,963 ft. the road drops down to Fagg on a 1.50 per cent. grade, which is the equivalent to the .6 per cent. ascending grade for empty car traffic. These grades, of course, involve the use of pushers, and they will be used on every train each way between the foot of the grade at Whitethorne, on the western slope, and Fagg, on the east, the extra engine remaining with the train on the down grade in order to work on the return. The distance thus worked will be about 17 miles.

Beyond Fagg the line strikes the North Fork of the Roanoke river, which it follows on to the Staunton river at milepost 240, when it again leaves the waterway to strike across the Blueridge mountains. It is in this section just beyond Roanoke that the road runs definitely into a limestone country. It would have been possible to have passed this barrier by following Staunton river just as the Chesapeake & Ohio effects the passage by way of the gap of the James river, and a complete survey and location was made over this route, but the stream is so crooked and the distance so much greater that it was abandoned for the sake of the line to the north, which crosses on an adverse eastbound grade of .2 per cent. at an elevation of 942 ft. This is not only high as compared with sea level datum but is well above the river, being 150 ft. above the river where it strikes it at milepost 240. This naturally requires heavy cutting, the heaviest being at Moneta station, where there is the 260,000 cu. yd. cut, elsewhere alluded to.

Along this section the excavations and fills are very heavy, but they are generally in the red clay that is the covering mate-

125-ft. Fill at Micajah Gap; Deepwater Railway.

rial for this section of the state and is, therefore, steam shovel work. The work can be carried on very expeditiously, the banks stand well, except for the washing down of the surface that occurs in heavy rains. Beneath the clay is the strata of granite that underlies the whole at varying depths, with 40 ft. as an average. Then, as the work goes on to the east, this clay is mingled with pieces of soft, almost disintegrated granite, which finally develops into a distinct rock in the neighborhood of Brookneal. Thence on to Jarrett, 80 miles from Norfolk, work becomes more difficult and, for the last 60 miles beyond Victoria, along what is known as the Nottaway Ridge, there is a light earth covering of about 15 ft. above the rock, which is hard granite, so that, in the deep cuts the work is severe. It is along this section, also, that great pains were taken in the location, and four general lines were run before a decision as to the final location was made. With this con-

dition of the country in view, it will readily be seen that the climb to the summit of the ridge at Meherrin and the subsequent drop to the Staunton river were strenuous work.

Along this portion of the line we again come upon a section of country where alternate lines were possible and a wide reach of territory, approximately 20 miles across, was thoroughly covered by the surveys and carefully mapped. Then came the comparatively level country rolling down into the plain to the east of Norfolk and the Dismal Swamp. This level country across which it would be easy to run an ordinary line offered a good many difficulties to the location of this .2 per cent. compensated eastbound grade. Again it is desired to impress upon the reader that this means a change of elevation of never more than 10 ft. to the mile and frequently not more than 5 ft. And when this is to be done across a country at right angles to the general trend of the streams it involves long cuts and fills, not necessarily deep, but from their very length involving the removal of a large mass of material.

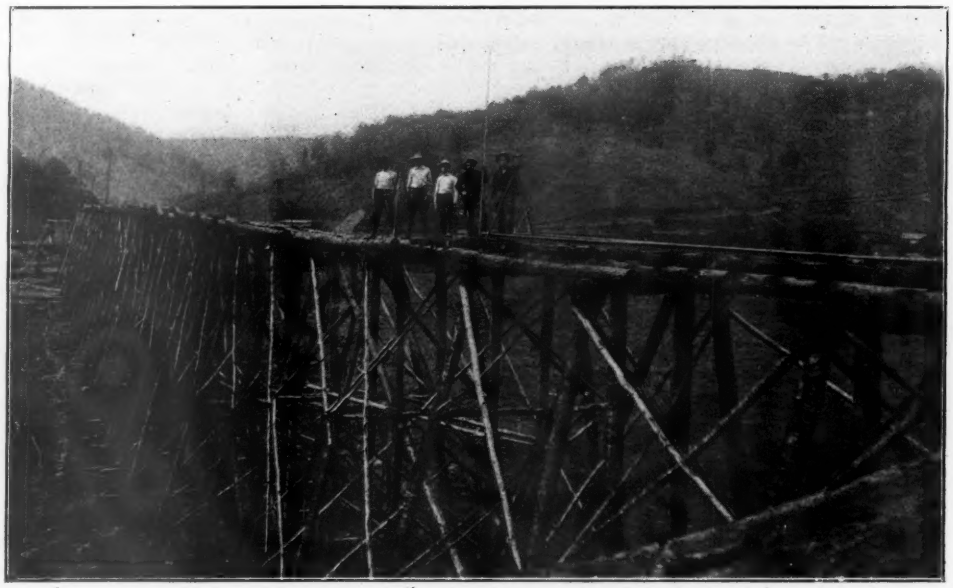
After leaving Brookneal the disintegrated granite mixed with the clay develops into regular ledges, and this in turn is followed by the very hard granite outcropping that runs north to Petersburg and Richmond, and from which the quarries at those places obtain their material.

All through the region alternative lines were run, sometimes covering a territory 40 miles across. For example, from milepost 135 to milepost 65 an alternative line was surveyed along the Nottaway river, which was abandoned in favor of one adopted. In the approach to Norfolk the line is run north and clear of the Dismal Swamp, so that easy connection can be made into Portsmouth and Norfolk. The latter city is avoided by a wide detour through the lowlands finally reaching the coal wharves at Sewall's Point, the terminal of the line. At this eastern end there is nothing but sand as far west as Suffolk, beyond which the country is rolling and the construction comparatively easy.

From what has been said it will be realized that the amount of excavation required along this line has been very great. Take the work in the mountains between Mullens and Micajah's Gap; there is one fill 125 ft. high that contains about 140,000 cu. yds, of material, most of which is rock from adjacent tunnels. After leaving Clark's Gap the country is easier and yet even through here the excavation amounted to from 60,000 to 70,000 cu. yds, to the mile. The profiles that are shown give a clear idea of some of the exceptionally heavy character of the work between Princeton and the New river bridge. The approach cut to the Oney Gap tunnel, for example, involved an excavation in rock of 153,000 cu. yds. at the west end and 30,000 cu. yds. at the east; and, again, at the New river, there is a cut of 100,000 yds. in rock. These are but typical of the work along the whole distance. Further to the east, after leaving the mountains and crossing the Alleghanies, there are exceptionally heavy cuts and fills. One cut near Moneta required 260,000 yds. of earth and rock excavation in a distance of 4,000 ft., and in the six miles beyond the material to be moved runs from 50,000 to 100,000 cu. yds. to the mile. Again in following the Nottaway ridge to cut off the bend of the Staunton river the grading is about 100,000 cu. yds. to the mile, through clay and rock.

To revert again to the general profile and the task involved in building this low grade line, attention is called to the map, upon which the two existing lines running from West Virginia coal fields to tidewater are shown.

In a way the Tidewater and Deepwater Railways will be in competition with the Chesapeake & Ohio and Norfolk & Western in that it runs from the Pocahontas coal fields to the sea. But, aside from this matter of general location, it does not touch the territory served by either of the other two except at a few isolated points, and will hardly compete in the sense of offering its facilities to any mine already reached by either of the other two. Its success, however, will depend upon the facilities which it can offer to proposed operations to market the output in competition with either or both of the other two lines.



Preparing to Fill at Rock, W. Va.; Deepwater Railway.

The prospect of being able to place coal upon the market in the face of this competition can be gaged by a comparison of the profiles of the three roads.

For this purpose we may start at the assembling point of the traffic of each. These may be taken as at Hinton for the Chesapeake & Ohio; at Bluefield for the Norfolk & Western, and Princeton for the Tidewater-Deepwater.

Taking the Tidewater-Deepwater, as shown in the upper of the three profiles, we have the assembling yard at Princeton from which there is a pusher grade to Oney Gap tunnel, about two miles; this is followed by an abrupt descent to the valley of the New river; with another adverse grade requiring a pusher at the crossing of the Alleghanies. This adverse grade is about nine miles long, though the pusher engines will run on to Fagg, eight miles beyond, to assist the westbound traffic. The same thing is done at Oney Gap, where there will be an overrun on the down grade of about 10 miles. Beyond this there is nothing to exceed .2 per cent. compensated grade against eastbound traffic. So that in a run of 350 miles double heading will be carried over only about 29 miles. Over the remainder of the line a single locomotive can haul the full rated tonnage of 80 loaded cars. In all the total rise of the Tidewater Railway between Princeton and Norfolk is 1,250 ft. on a run of 350 miles.

Fill on East River, Deepwater Railway; N. & W. Tracks Below.

In the case of the Chesapeake & Ohio, with Thurmond as the assembling point, 418 miles from Newport News there is a continuous rise to the crest of the Alleghanies, a distance of 82 miles. Part of the distance is on comparatively easy grades, but most of the way would require pushers for handling the proposed train tonnage, and this service would have to be carried on to Clifton Forge, 304 miles from Newport News. From Clifton Forge to Richmond the line follows the old James river canal, and is a continuous down grade. Beyond Richmond there are two places of from five

to eight miles in extent where pushers would be required if the proposed tonnage were to be moved. The total rise would be 1,347 ft. With Hinton as the point of assemblage the lift would be about 1,050 ft.; and the distance 385 miles, with a pusher service approximating 90 miles. These figures may not correspond to the actual work done on the road, but they are approximately what would be required for a service similar to that proposed for the Tidewater-Deepwater.

On the Norfolk & Western, with the traffic originating at Bluefield, 364 miles from Norfolk, there is a total rise of about 2,894 ft., and a requirement for a pusher service of at least 130 miles if the same tonnage basis is to be preserved.

The following table gives a resumé of the data of these lines:

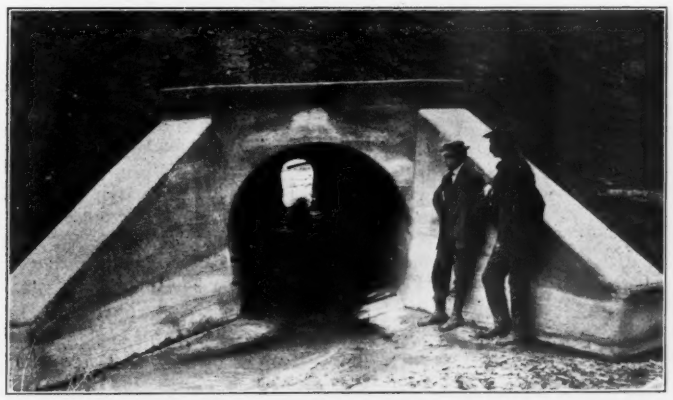
Line	From	To	Distance in miles.	Total rise in feet.
Tidewater-Deepwater...	Princeton	Norfolk.....	350	1,250
Chesapeake & Ohio.....	Thurmond	Newport News	418	1,347
Chesapeake & Ohio.....	Hinton	Newport News	385	1,050
Norfolk & Western.....	Bluefield	Norfolk.....	364	2,894

With these conditions in mind where distance, grades, curvature and total elevation are in favor of the new line, with the single exception of the total rise on the Chesapeake & Ohio, considering Hinton as the assembling point of originating traffic, it seems that that new line can reasonably expect to compete profitably with those now in existence. The officials who are directly responsible for the engineering features of the work are H. Fernstrom, Chief Engineer, and Raymond DuPuy, General Manager. W. N. Page is President of the Tidewater Railway and Dr. J. O. Green of the Deepwater. The other officials participating in the work and holding the same position in both corporations are: B. T. Elmore, Assistant Chief Engineer; L. R. Taylor and E. Gray, Jr., are the Principal Assistant Engineers; F. F. Harrington is Engineer of Bridges, and C. H. Stengel, Designing Engineer.

The Tidewater and the Deepwater Railways.

CULVERTS, TRACK AND TUNNELS.

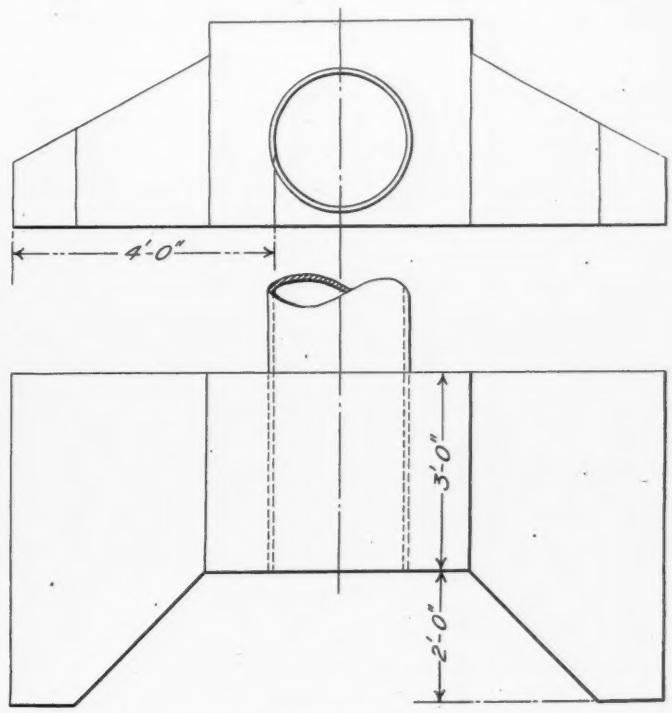
In the previous article on the Tidewater and Deepwater Railways, the general features of the line and the methods of conducting the surveys were discussed. From what has been said it will be seen that thoroughness is characteristic of the whole of the undertaking. It follows, then, that with such a preparation as that outlined, this thoroughness and carefulness should be carried into the execution of all of the work. Starting in the way it has, with no large towns except Roanoke to consider, and with the main fixed idea of obtaining low-cost hauling facilities for coal, it is natural that the adoption of standard forms of construction should have received early attention. As soon as any particular plan is determined on, a standard is developed that can be used the whole length of the line. These standards cover a wide range of items from stations to crossing signs, and from pipe culverts to viaducts, many of which will be illustrated in detail. In addition, standard methods of executing the work were prescribed.



Arch Culvert; Tidewater Railway.

The permanent way and that which pertains to it naturally received the first consideration, and so there have been developed an elaborate system of standards for culverts, viaducts and bridges. Starting with the smaller types of culverts that can be formed of cast pipe, a complete table of the lengths of the various sizes of pipes that would be required for different heights of fill was drawn up.

In laying pipe culverts it was specified that the grade should not be less than 1 in 100, and that the pipe should be cambered under the center of the fill so as to allow for settlement; the amount of this camber to be dependent upon the depth of the fill over the pipe and the character of the foundation. In no case, however, was the camber made so great that the central portion of the pipe was higher than the inlet. In other words, the camber must be less than 1 in 100. Ordinarily the pipe was laid in 12-ft. lengths, but where it was necessary half-lengths were used. The ends of all pipes of 18 in. or more in diameter were protected by rip rap laid by hand and to the approximate dimensions shown in the engraving. Further than this, the joints were made thoroughly watertight by the use of 1:2 Portland cement, mortar and oakum. These pipes were also carefully coated with asphaltum before being laid, and



Concrete Heading for Pipe Culvert.

were well tamped in place, excavations being made to receive the bell projections.

Length of Pipe in Feet for Various Heights of Fill and Sizes of Pipe.

Height of bank.	Diameter of pipe in inches										
	10	12	14	16	18	20	24	30	36	42	48
3 ft.	24	24	24	24	24	24	24	..	..	..	..
4 "	30	30	30	30	24	24	24	24	24	..	..
5 "	30	30	30	30	30	30	30	24	24	24	24
6 "	36	36	36	36	30	30	30	30	30	24	24
7 "	36	36	36	36	36	36	36	30	30	30	30
8 "	42	42	42	42	36	36	36	36	36	30	30
9 "	42	42	42	42	42	42	42	36	36	36	36
10 "	48	48	48	48	42	42	42	42	42	36	36
12 "	54	54	54	54	48	48	48	48	48	42	42
14 "	60	60	60	60	54	54	54	54	54	48	48
16 "	66	66	66	66	60	60	60	60	60	54	54
18 "	72	72	72	72	66	66	66	66	66	60	60
20 "	78	78	78	78	72	72	72	72	72	66	66
22 "	84	84	84	84	78	78	78	78	78	72	72
24 "	90	90	90	90	84	84	84	84	84	78	78
26 "	96	96	96	96	90	90	90	90	90	84	84
28 "	102	102	102	102	96	96	96	96	96	90	90
30 "	108	108	108	108	102	102	102	102	102	96	96

Where the drainage area was too great for the flow of water to be cared for by 36-in. pipes, box or arch, culverts were used and these were also standardized. These standards ranged from 2 ft. by 2 ft. to 4 ft. by 6 ft. for the box type, after which comes the arch construction in sizes running from 4 ft. by 6 ft. to 15 ft. by 15 ft.; the intermediates being 6 ft. by 6 ft., 8 ft. by 8 ft., and 10 ft. by 10 ft.

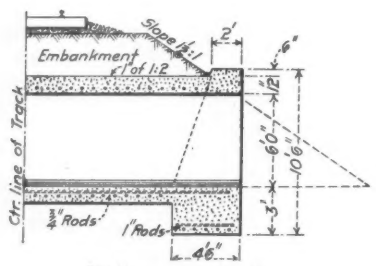
These box culverts are all of concrete and are of the general design shown in the illustration of the 4 ft. by 6 ft. box culvert. In this the dimensions shown for the foundations are the minimum allowed, and they are carried deeper where the nature of the soil requires. The reinforcing consists of 1 in. rods laid in both directions, as shown, near the base of the foundation. The cover and sides are made of 1:3:6 concrete with a somewhat poorer invert, which is of 1:4:7½ with a coating of 1:2 cement mortar 1 in. thick. The top and sides of the barrel of the culvert are waterproofed with a coating of straight run coal tar pitch ⅛ in. thick. All exposed edges of the concrete are rounded to a radius of 1 in. to prevent chipping, and the tops of the parapet walls are sloped inward. It may be added that, in the reinforcing of these culverts, the contractors were allowed to use old rails instead of the rods if they so desired.

The arch culverts were developed with the same completeness of detail. They conform, in a general way, to the scheme followed in the design of the box culvert, in that the reinforcement of the foundation is formed by rods at right angles and extending the whole length near the bottom. In the 12 ft. by 12 ft. culvert, illustrated, the arch is reinforced with a galvanized wire mesh, made

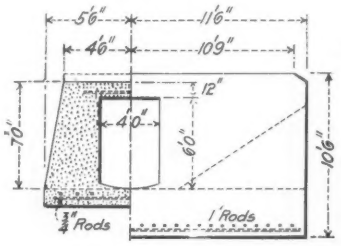
of No. 8 wire laid in a 1-in. by 2-in. mesh. The arch is formed of 1:2:4 concrete on a foundation of 1:3:6, and this latter mixture is also used for the invert, which is made thin and not carried down to the bottom of the foundation. Where the bearing soil is poor, piles are driven to carry the load. As in the case of the box culverts, the top of the arch construction is coated with a layer of straight-run coal tar pitch ⅛ in. thick for reinforcing at the bottom of the foundation, 1-in. bars are shown, but the contractor was at liberty to substitute old rails if he preferred.

For open drains one general plan was followed, that of laying up side walls of 1:3:6 concrete upon suitable foundations, using piles where necessary and carrying the track upon two stringers, each made of three I beams, bolted in nests, and placed directly beneath the rails, as shown in the illustration. These carry the ties to which the rails are spiked. This is a somewhat more expensive construction than that used on many older roads where old rails are substituted for the I beams, but in this new road old rails are not available.

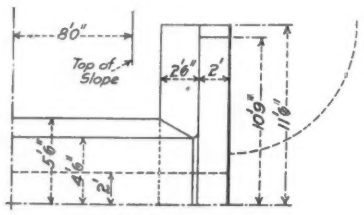
In deciding upon the type and size of culverts to be used at any



Section on center line.



Half section, half end view.



Half plan.

Standard 4 ft. x 6 ft. Box Culvert.

particular place, the engineers were guided by a very carefully compiled table drawn up in accordance with the flow produced by a maximum rainfall over the drainage area involved. This is based not only upon the area drained but also the character of the country. The line from Norfolk to Princeton is, therefore, divided into sections, to each of which a coefficient is assigned. Of course, as in all cases, these are not hard and fast conditions from which there can be no variation, for the judgment of the engineer must be exercised in the selection of the coefficient to be used in the determination of the size of the opening. For large openings greater than that of 10 ft. by 10 ft. culvert, the decision as to what it should be was made by the chief engineer. Then, too, there might readily be a variation from the coefficient laid down for any particular section, because of local information regarding the flow of streams and their high-water marks.

Bearing in mind the character of the country through which the road passes, as set forth in the previous article, it will be seen that the coefficient by which the final area of the opening is determined increases as we move west from Norfolk. In other words, as the country becomes rougher, and the flow of water more rapid, the area of opening to care for a given watershed increases twofold. The table, as it stands, is therefore adapted to water openings in the comparatively level country immediately west of Norfolk, but is insufficient for the rougher country. Hence the coefficients used, with variations subject to the judgment of the engineer, are as follows:

Section.	Coefficient.
Norfolk to Jarratt	1.00
Jarratt to Meherrin	1.50
Meherrin to Brookneal	1.75
Staunton River, Goose Creek, Roanoke and New River sections, with a few exceptions where a higher coefficient may be used	2.00

The method of using the table and coefficient is this:

For any given drainage area, select the opening given in the table as a base and multiply it by the proper coefficient using the product as the area of the opening actually to be used. For example:

Norfolk to Jarratt, area drained, 20 acres—3.1 sq. ft. x 1 coef. = 3.1 sq. ft. opening = 24-in. pipe.

Jarratt to Meherrin, area drained, 20 acres—3.1 sq. ft. x 1.5 coef. = 4.7 sq. ft. opening = 30-in. pipe.

Meherrin to Brookneal, area drained, 20 acres—3.1 sq. ft. x 1.75 coef. = 5.4 sq. ft. opening = 2 ft. x 3 ft. culvert.

Staunton River, etc., area drained, 20 acres—3.1 sq. ft. x. 2.00 coef. = 6.2 sq. ft. opening = 36-in. pipe.

Sizes of Culverts and Pipes for Various Drainage Areas.

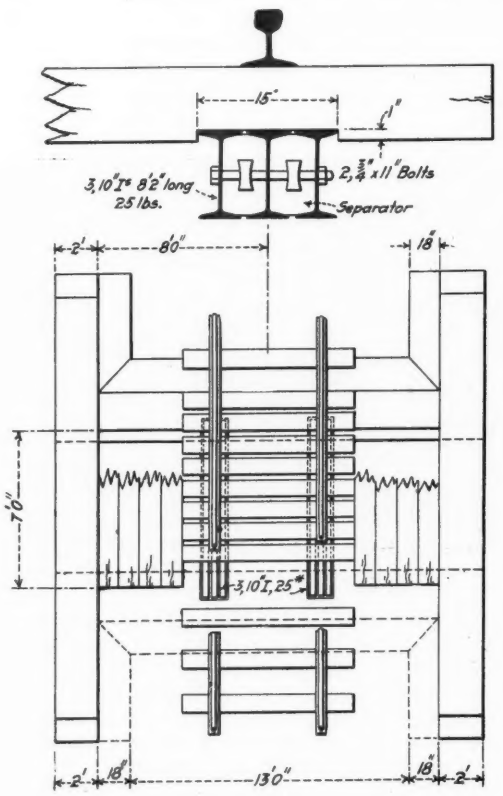
Area drained.	Area opening required—In sq. ft.	Size clvrt or pipe.	Area drained.	Area opening required—In sq. ft.	Size clvrt or pipe.
1 acre.	0.4	.....	126 acres.	9.6	.....
1.3 acres.	0.5	10-in. pipe.	140 "	10.2	.....
2 "	0.7	.....	152 "	10.9	3x4 or 4x3 ft. cul.
2.7 "	0.8	12-in. pipe.	160 "	11.1	.....
3 "	0.9	.....	180 "	12.0	.....
4 "	1.1	.....	198 "	12.6	.....
6 "	1.4	16-in. pipe.	200 "	12.7	.....
8 "	1.7	.....	240 "	14.3	4x4-ft. culvert.
8.4 "	1.8	18-in. pipe.	280 "	15.5	.....
10 "	2.0	.....	320 "	16.6	.....
11.2 "	2.2	20-in. pipe.	360 "	17.8	4x5-ft. culvert.
12 "	2.3	.....	400 "	19.0	.....
14 "	2.6	.....	500 "	22.0	4x6-ft. culvert.
16 "	2.8	.....	600 "	24.2	.....
20 "	3.1	24-in. pipe.	1 sq. ml.	25.0	.....
25 "	3.5	2x2-ft. arch clvrt	1.4 sq.mls.	30.4	6x6-ft. culvert.
30 "	4.0	.....	1.5 "	32.5	.....
35 "	4.4	.....	2 "	39.0	.....
40 "	4.8	.....	2.5 "	44.0	.....
42 "	4.9	30-in. pipe.	2.7 "	46.0	8x8-ft. culvert.
45 "	5.2	.....	3 "	49.0	.....
50 "	5.5	2x3 or 3x2 ft. cul.	3.5 "	54.0	.....
60 "	6.0	.....	4 "	60.0	10x8-ft. culvert.
70 "	6.6	.....	4.5 "	65.0	.....
78 "	7.1	36-in. pipe.	5 "	70.0	.....
80 "	7.2	.....	5.2 "	72.3	10x10-ft. culvert.
90 "	7.8	.....	6 "	75.0	.....
100 "	8.3	3x3-ft. culvert.	7 "	85.0	.....
120 "	9.3	.....			

The above table is based on coefficient — 1.

The importance of this standardization of culvert construction can hardly be exaggerated for, by this careful study of the character of the country, it made it possible for the division engineer in the field to decide as to the size and character of all minor openings as they were reached without the necessity of referring them to headquarters, and yet with the assurance that the practice both as to size of opening and character of the construction should be uniform throughout the whole extent of the line. When it is remembered that the road is carried across innumerable small streams, as it cuts across the natural flow, the value of such uniformity is very great.

THE TRACK.

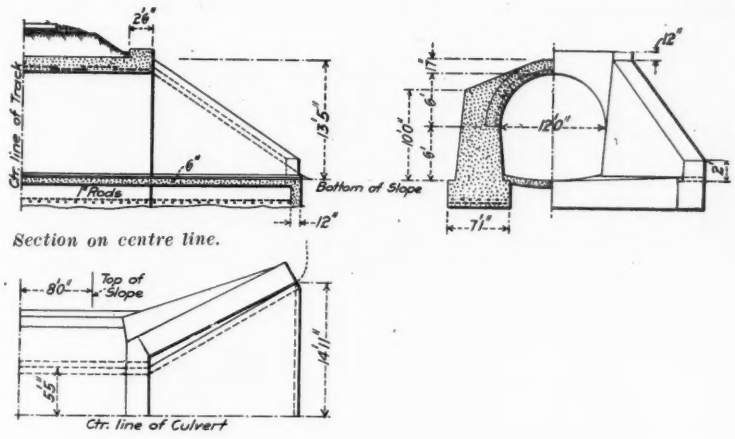
It is seldom, even on old and well established lines, that the degree of excellence in track construction is required that there is in the case of the Tidewater-Deepwater, and it is almost never



Standard Open Drain.

required for a new road through a sparsely settled country where there are no large centers of trade.

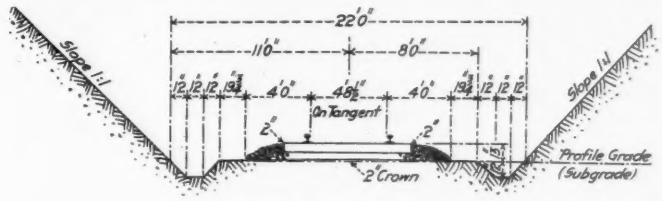
To start with, the width of the grade in cuts is 20 ft., and in fills, 16 ft. On fills the slopes come down at the rate of 1 in 1½. In cuts there is a 12-in. ditch beyond the grade slope, from which the bank rises at the rate of 1 in 1. This is common construction, but it is not common for a road to be ballasted with broken stone from end to end even through districts where no stone is to be found. This is being done in this instance. After the track has been laid on the subgrade it is raised about 3 in. and blocked with flat spalls until the ballast can be spread and tamped beneath the ties. When



Section on centre line.

Plan.

Standard 12 ft. x 12 ft. Arch Culvert.



Standard Single Track Roadbed.

Earth excavation.

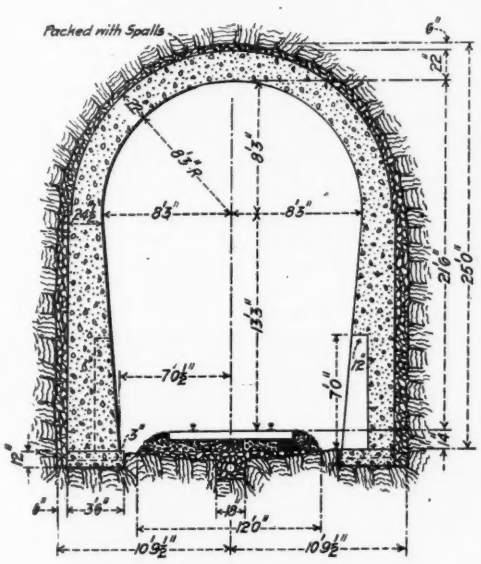
this has been done, the track will be allowed to stand and settle under the traffic of the construction trains until everything has come to a bearing. It will then be jacked up and the ballast tamped beneath the ties until the top surfaces of the latter are 15 in. above the subgrade. The ballast will consist of crushed rock that will pass through a 2½-in. ring, with all screenings and particles less than ¾ in. in diameter removed.

The track will be laid with 85-lb. rail of the A. S. C. E. section on ties of 9-in. face. The latter will be piled in accordance with the standards adopted as shown in the illustrations. The open method will be used for ties to be used by contractors, with the alternate layers removed to facilitate inspection or where the ties are to remain in the pile for more than three months. After the ties have been accepted and distributed they will be piled in crib work, provided they are not to remain in the pile for three months.

The alinement of the track, of course, follows the grade, and this has been laid out with an easement approach at both ends of every curve. These easements form a spiral curve that approaches that of a parabolic arc though the method of laying it out is much simpler. This easement curve has twice the length of the circular arc which it replaces, though the angle subtended remains the same. In laying it out, the spiral curve is divided into as many stations as there are degrees in the curve for which it forms the approach, and each of these stations increases one degree in curvature above the preceding one. It will be seen, too, that by varying the length of the stations the spiral may be made as sharp or as easy as the tangent conditions will allow. For example, if the stations are made 50 ft. long the approach will have but half the angular sharpness that it would have were the stations to be given a length of 25 ft.

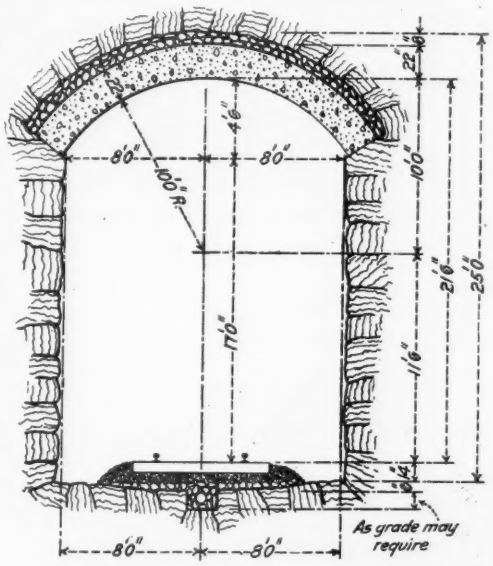
The principal advantage of this method of easement approach lies in the fact that it leaves the tangent in its original position instead of shifting out to meet the spiral when the latter is substituted for the circular arc connecting the two tangents. At the same time the center of the curve is drawn into the angle, as shown by the sketches. In one the easement throws the tangents out but leaves the center of the original curve unchanged in its position. In the other the tangent remains fixed and the connecting curve is drawn in.

There is a slight difference in the character of the easements on the Deepwater and Tidewater sections of the line, on account of the difference in the character of the country through which they run. On the Deepwater, spiral approaches are used for all curves of 5 deg. or more, while on the Tidewater this rule holds for all curves of 2 deg. or more. Further spirals are used to connect any two adjacent sections of a compound curve where the difference between them is 2 deg. or more, as in the case of a 4-deg. and 6-deg. curve. Finally, wherever there is a break in the grade of more than $^2/_{10}$ per cent. a vertical curve is used to connect the two sections, but where the break is $^2/_{10}$ per cent. or less no vertical curve is used.



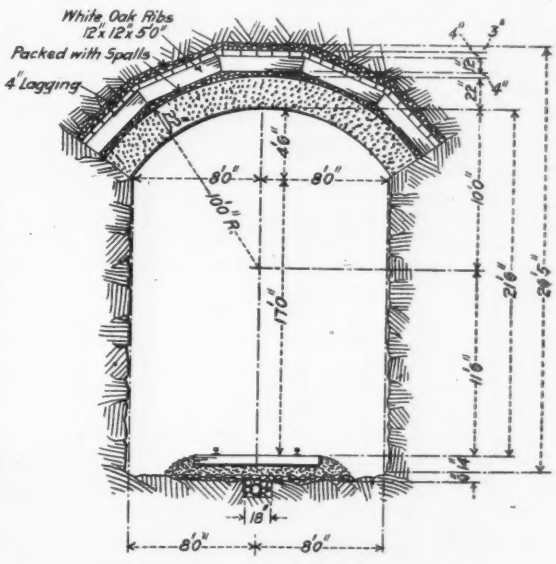
Standard Single Track Tunnel.

Firm, but not self-sustaining material.



Standard Single Track Tunnel.

Solid rock, firm sides and roof. Danger of future falls.



Standard Single Track Tunnel.

Solid rock, yielding roof, firm sides.

Method of Laying Out Curves; Tidewater and Deepwater Railways.

TUNNELS.

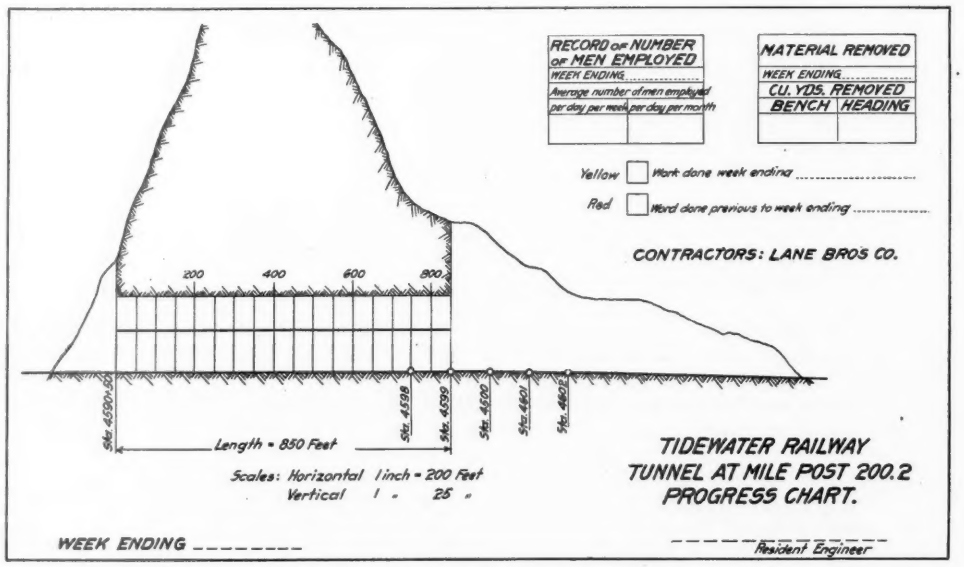
It follows, as a matter of course, that in building a low-grade

Track and Cut near Elmore, W. Va.; Deepwater Railway.

line through such a country as southern and western Virginia and West Virginia, tunnel work must be frequent. It has been remarked that a low grade air line can be built through any country if you will only stay under ground enough of the time. So while tunnel work has not been courted in the work, it has not been avoided at the expense of grade or alinement. As in the case of other details of the road, the tunnels have been standardized to as great an extent as the nature of the work would allow.

In much of the work west of the Alleghanies the treacherous nature of the rock is such that a facade is required for the entrances and one has been designed and is used wherever it is directed by the chief engineer. It is of concrete and for a single track; slightly oval in section with a diameter of 16 ft. 6 in. at the spring of the arch and 14 ft. 1 in. wide at the subgrade. The top of the parapet is 13 ft. 8 in wide and is backed by a paved ditch that empties into a circular catch basis from which a pipe whose size depends upon the area to be drained leads down to the ditch at the bottom of the tunnel. The catch basis has a depth of 2 ft. and a diameter of 18 in., and is fitted with a perforated cast-iron cover to keep out the coarse material. The ditch itself is paved with cobbles. Finally waterproofing is applied to the crown of the arch as indicated, the concrete used being the standard class B or 1:3:6 mixture, while a 1:2:4 mixture is used for the cap of the parapet.

For the tunnel sections themselves, five standards have been adopted, to be used according to the nature of the material through which the excavation is made. These sections are known as types A, B, C, D and E. In all of these the clear height of the crown of the arch above the base of the rail is 21 ft. 6 in. Of these types, A is the simplest. It is applied in rock where there is no danger of cave-ins. It has a semi-circular roof with a radius of 8 ft. with vertical sides 16 ft. apart and is not lined. The bottom beneath the ballast is paved with coarse stones, and there is a pump and drain pipe as with type B. Type A requires about 12.63 cu. yds. of excavation per lineal foot. Type B is also used in rock where the sides timbered for support and before the concrete arch is laid. The main support is in the 12-in. by 12-in. timbers that are cut to 5 ft. lengths and formed into an arch over which a 4-in. lagging is placed. The space above the timbering, as well as that between it and the concrete, is packed with spalls. In other respects this section corresponds to the type B both in the quality of the concrete and the general dimensions used. Owing to the space occupied by the timbering the amount of excavation is greater than in type B, it being 16,233 cu. yds. per lineal foot. The concrete remains the same at 1.435 cu. yds. and to this must be added 171 ft. of timber, board measure, based on a rib spacing of 5 ft. centers, a spacing that is varied with the nature of the cover.



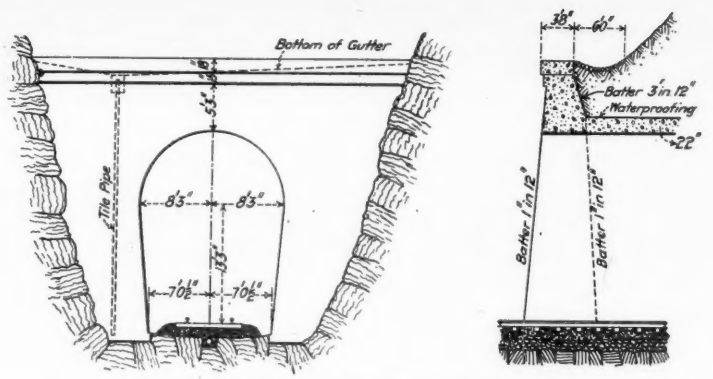
Progress Chart; Tidewater Railway.

The D section is one lined with concrete and is used in materials that are firm but not self-sustaining. The cross section of the opening is identical with that of the concrete portal, and the method of draining is the same as that of the other tunnel sections. The concrete used is poorer in cement than that used for the arches

Jenney's Gap Tunnel; Deepwater Railway.

are firm, but where there is danger of the roof coming down. In this the sides are vertical, as in class A, up to a height of 17 ft. above the base of the rail, at which point a concrete arch of 4 ft. 6 in. rise and 10 ft. radius is sprung. This arch is of 1:2:4 concrete, of a thickness varying with the character of the cover to be held, but which is made 22 in. as a minimum. The space above the arch and beneath the rock is packed with spalls as a protection against sudden falls upon the concrete itself. On curves the section is widened according to the degree of curvature of the track. The drainage at the bottom is of the same character as that of type A, vitrified pipe with open joints being laid beneath the ballast, as shown in the section. The quantities required for this section are 14.809 cu. yds. of excavation and 1.435 cu. yds. of concrete masonry per lineal foot.

Type C is the section that has been adopted where the sides of the tunnel are firm and the roof yielding. In this the roof is



Facade, Standard Single Track Tunnel.

of types B and C, it being a 1:3:6 mixture. The thicknesses of the lining, as given in the engraving, are the minimum dimensions that are allowable, and these are increased as occasion may demand. In this section refuge niches 3 ft. wide with circular tops are provided every 200 ft. on each side and staggered so as to provide a refuge at half that interval throughout the whole length of the tunnel. Weep holes are also provided, leading from the sides to cross drains, as local conditions may require. The space between the concrete and the material on all sides is packed with a layer of 6 in. of spalls. In this section the excavation exceeds that of any

Ingleside Tunnel; Tidewater Railway.

of the others, it being 18.537 yds. per lineal foot, with 1.955 cu. yds. of concrete masonry in the arch and 3.085 cu. yds. in the side walls.

The E section is used in yielding material, and is a timbered tunnel lined with concrete; the dimensions of the latter corresponding with those of the D section, though a richer or 1:2:4 mixture is used. The timbering is of the same character as that used in the C section, except that it is carried down the sides instead of being confined to the roof. This section requires 21.82 cu. yds of excavation and 489 ft. board measure of timbering per lineal foot. The masonry for the same distance consists of 1.955 cu. yds. in the arch and 4.323 cu. yds. in the side walls.

In driving these tunnels various methods have been employed in the detail of the work. Sometimes it has been from shafts sunk from above with a heading driven in each direction, though usually the work has been by approach from the two ends. In a number of cases elaborate preparations had to be made in the way of building roads, sometimes laying rails on them for the transportation of material and supplies, and in many instances this also involved the erection of expensive compressor plants to supply air to the drills.

A very complete system of progress charts was also provided by which the condition of the work could be exactly determined at any time. This was quite essential to a proper supervision from headquarters since, in the distance between mileposts 103 and 362, there are twenty tunnels with a total length of 18,786.3 ft., the longest being the one at the summit crossing the Alleghany mountains, with a length of 5,139 ft., and the shortest at milepost 291, which is but 450 ft. long. The system by which the reports of progress were kept consisted of a blueprint upon which there was a longitudinal section of the tunnel divided vertically by lines 50 ft. apart on the scale and by a horizontal line to separate the bench from the heading. Two sets of these prints were provided, one for the week ending and one for the month. These were colored red and yellow, as directed, and sent to the office of the chief engineer at the end of each week and month by the resident engineer, with the other data called for. In this way a complete record was obtained of the number of men employed and the material removed as called for on the blank. The two blanks are identical in every particular, except that one is for the month and the other for the week.

It is this portion of the work that will probably fix the time for the opening of the road, and the tunnel that will be the last to be completed will undoubtedly be that at the summit of the Alleghanies, and this is now being pushed as rapidly as possible.

The prosecution of this work may be taken as a sample of that done elsewhere, though it is on a larger scale than is ordinarily required. The contractors have installed a very complete power plant near the opening of the shaft that is about midway between the two portals, besides having built a standard gage railroad from a connection with a local mining road up to the power-house. In this way a direct connection is made with the Norfolk & Western and all supplies are brought in over the line, which is about 2½ miles long. Four headings are being driven, and the advance is at the rate of about 380 ft. per month, through rock.

Portal of Tunnel at Mile Post 58; Deepwater Railway.

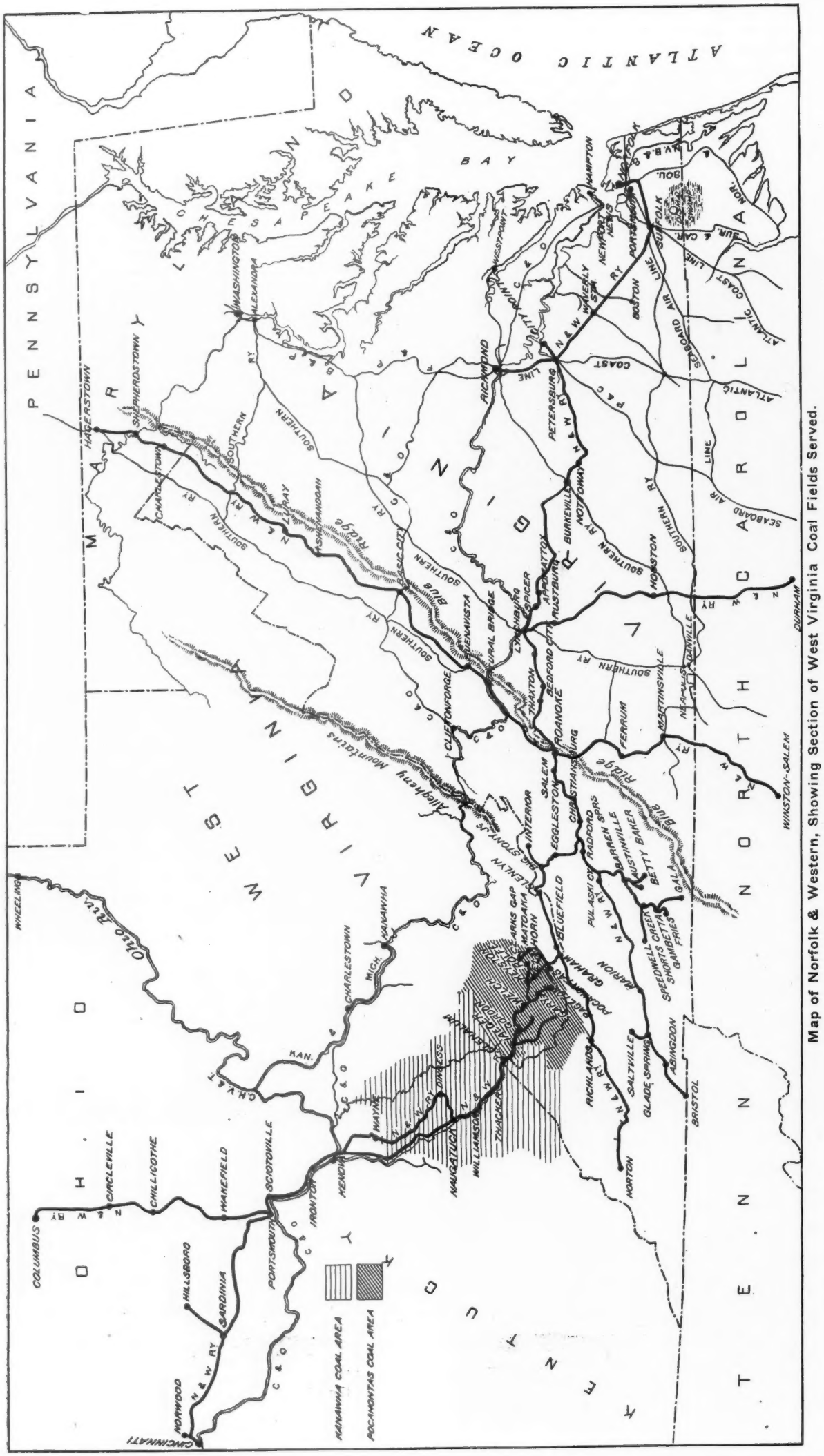
Norfolk & Western Improvement Work.

BY GEORGE L. FOWLER,
Associate Editor of the *Railroad Gazette*.

GENERAL FEATURES AND IMPROVEMENTS.

In the issues of the *Railroad Gazette* for July 3, July 24, September 25, and October 2, 1903, there was published a series of articles relating to the physical and operating conditions of the Norfolk & Western Railway as they existed at that time. The coal traffic from the Pocahontas and Thacker districts was increasing rapidly and the company found that unless the facilities for handling this traffic were at once increased there would be a congestion which it would be impossible to relieve. Already conditions of this sort had been encountered on the westbound work, which had been relieved by building the Big Sandy line from Naugatuck to Kenova, by which a low-grade track for westbound traffic had been obtained and the distance shortened by about 24 miles. This had not, however, afforded any relief at division points where the yards were too small for the demands made upon them, to say nothing of the requirements of the future. Accordingly, at the time of the publication of the articles referred to the company had planned an elaborate range of improvements in the form of yards at Roanoke, Va.; Bluefield and Williamson, W. Va., and Portsmouth, Ohio, in addition to a straightening of the exceedingly crooked portion of the line lying in the midst of the West Virginia mountains between Vivian and Naugatuck. A considerable proportion of this work has now been completed. But, while none of the yards is entirely finished, the work has been executed to such an extent in all of them that they are in operation, and a great deal of the double-tracking on the mountain portions of the line has been finished or is under contract. Not only has this been done, but much additional work made necessary by increase in traffic has been planned and partially contracted for in double-tracking the main line on improved alinement and grades. The principal part of these additions are to be found in the reconstruction and double tracking of the line on the Norfolk division between Montvale and Forest, a distance of 27 miles, and the construction of a low-grade line on high ground around the city of Lynchburg from Forest to Concord, a distance of about 21 miles, while the distance between these points by the present line is about 23½ miles.

In order to appreciate the true significance of these improvements and why these new alinements were not used in the first place, a few words regarding the general topography of the country

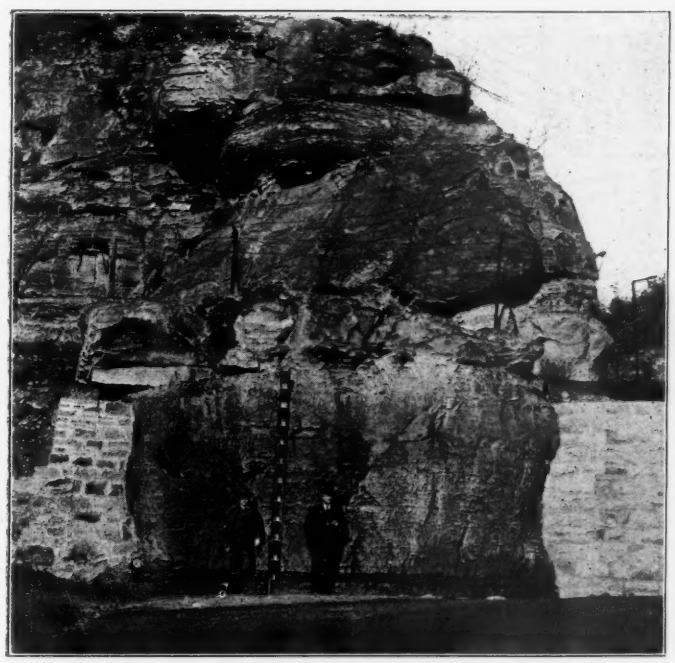


Map of Norfolk & Western, Showing Section of West Virginia Coal Fields Served.

and the conditions governing at the time of construction will be in place.

The Norfolk & Western Railway was not built or even planned in its entirety at the start. It exists as the result of a number of consolidations and extensions that have required nearly 60 years to complete. It did not even start from the seaboard at first. The nucleus of the road lay in the Petersburg Railroad, built from Petersburg to City Point in 1851. A second and disconnected section known as the Virginia & Tennessee Railroad was built from Lynchburg to Liberty, now Bedford, in 1852, and this was extended to Roanoke, then known as Big Lick, in 1855. This was carried on to Bristol, Tenn., in 1858. In 1854 the Norfolk & Petersburg Railroad was opened between those points, and then run on to Burkeville the same year, as the Southside Railroad, and thence to Lynchburg in 1857. The Virginia & Tennessee, the Norfolk & Petersburg and the Southside railroads were consolidated in 1870 as the Atlantic, Mississippi & Ohio Railroad, and, in 1881, when it had 408 miles of main line and 20 miles of branches, the name

View on Norfolk & Western Railway near Glenalum, West Va.



Pocahontas Coal Seam at Pocahontas, Va.

was changed to the Norfolk & Western Railroad, from which time dates the extensions into the coal regions of Virginia and West Virginia. The New River Railroad was acquired in 1882 and opened for business a year later to Pocahontas, Va., where the first development of Pocahontas coal took place. In the next three years, extensions were made into this field on the eastern side of the mountains.

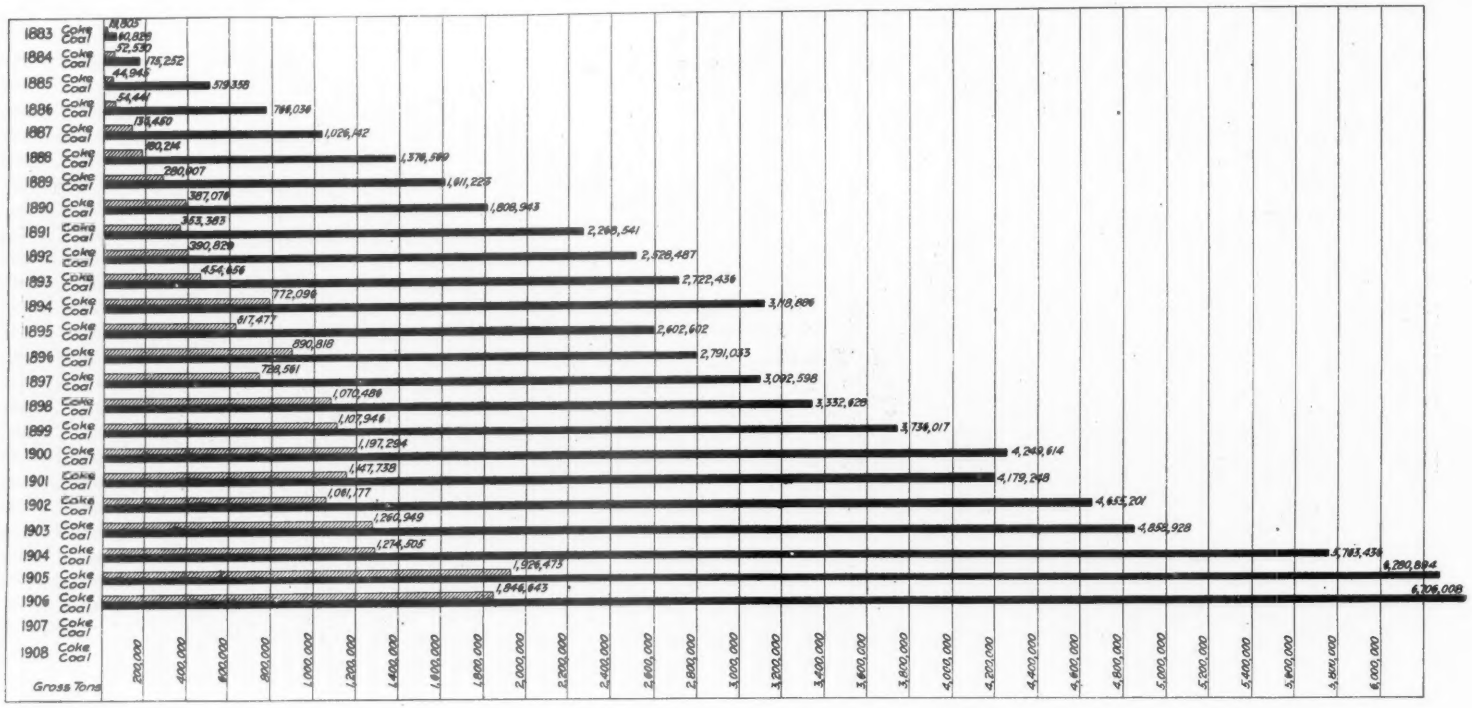
In 1886, the Cripple Creek Extension, from Pulaski, Va., 26 miles to Foster Falls, Va., in the direction of North Carolina, opened a territory of great mineral wealth. In 1887, the Elkhorn tunnel was started through the Flat-Top mountain and the Elkhorn Pocahontas coal field was opened in 1888. This was the initial step toward the route to the Ohio river. The Clinch Valley Extension, affording an outlet via the Louisville & Nashville, through Norton, Va., was finished in 1891. During the same year the Norfolk & Western began building into the Elkhorn Valley. The Shenandoah Valley Railroad, between Roanoke and Hagerstown, Md., was absorbed in 1890, and two years later the Roanoke & Southern, between Roanoke and Winston-Salem, N. C., and the Lynchburg, between Lynchburg and Durham, N. C., were leased.

At the same time the main line was being pushed on to the west until it reached the Ohio river, and then the acquisition of the Scioto Valley Railroad gave a through route from Norfolk to Columbus, by way of Kenova and Portsmouth.

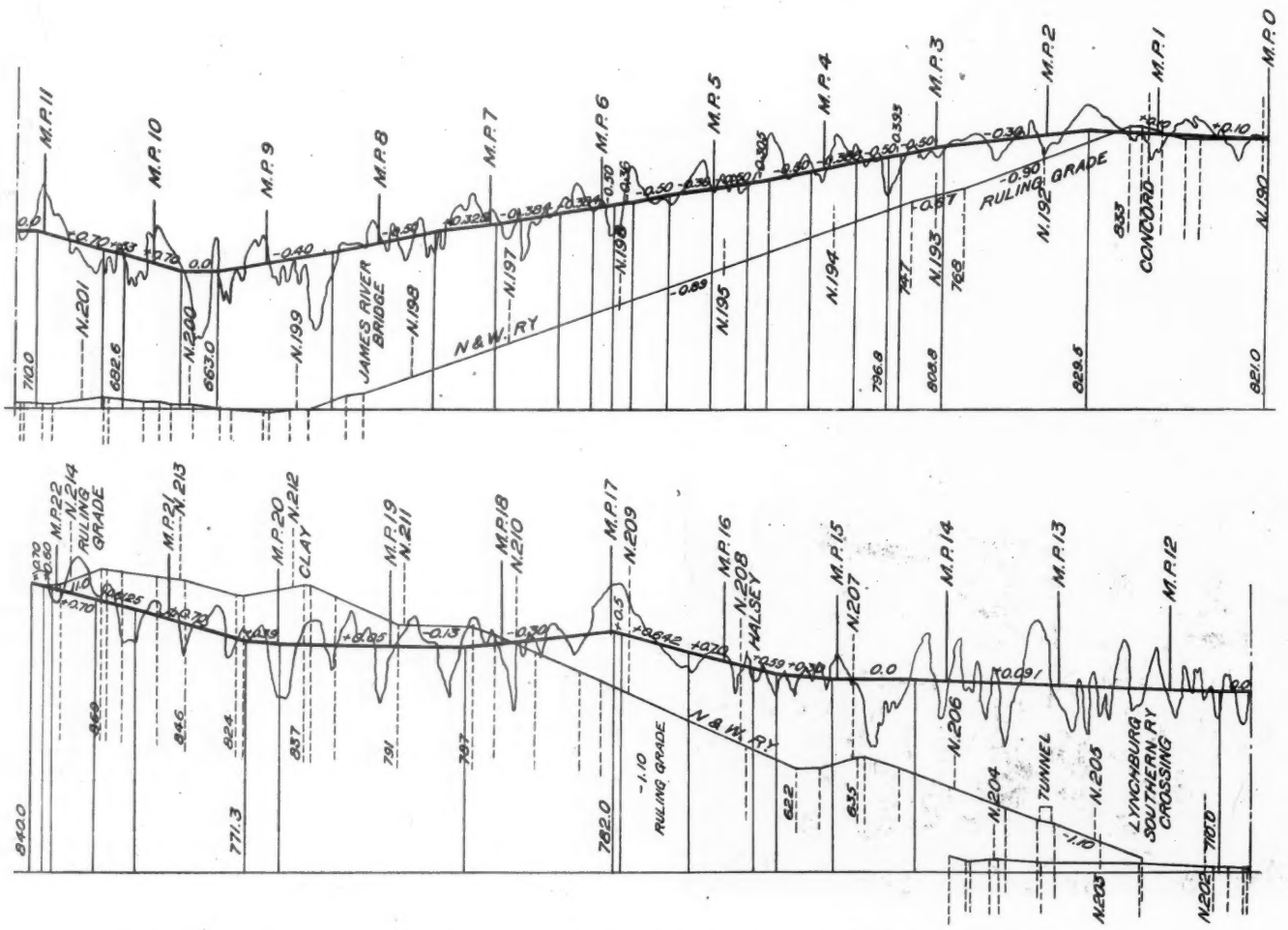
The system, thus built up, was reorganized in 1897 as the Norfolk & Western Railway Co., and now owns more than 1,800 miles of main line and branches.

At the time of the building of the early lines that formed the nucleus of the system there was little or nothing beyond the

purely local traffic to be expected. Nothing specific was known regarding the coal fields of West Virginia, and what was known was not of such a character as to attract capital. Indeed, it is said that, when the Pocahontas fields were first placed upon the market they could not find a buyer, so firm was the conviction that no coal could compete with that from the Pittsburg district. All this had its effect upon the original alinement, which naturally sought the large towns and centers of population. So, after the coal had been brought to the attention of consumers and was found to be of an exceptionally high character, and it was decided to push the line through to the Ohio river, there was still not enough in sight either in the form of the then present or future output to warrant the bold piercing of mountains and the construction of bridges that has recently been undertaken. After entering the mountains and reaching the level of Elkhorn Creek, which is done a short distance beyond the eastern boundary of the Pocahontas field, the natural and economical course to be pursued, both in cost of survey and construction, was to follow the banks of this stream down to its junction with the Ohio, which would give a low-grade, constantly descending line, but one which was exceedingly tortuous, as will be seen by reference to the map of a portion of the alinement where straightening is to be done. This was the course pursued as far west as Naugatuck, 484 miles from Norfolk. At this point there is a detour of the old line running back into the hills, for the purpose of reaching the coal properties that were known to exist and regardless of the extra cost of haul-



Graphical Illustration of Annual Coal and Coke Shipments; Pocahontas Flat-Top Field.



Profile of Lynchburg Belt Line & Connecting Railway and Norfolk & Western Railway.

age, so that it was not until 1904 that it was found to be necessary to add to the facilities and build the low-grade line down the Big Sandy river to the Ohio.

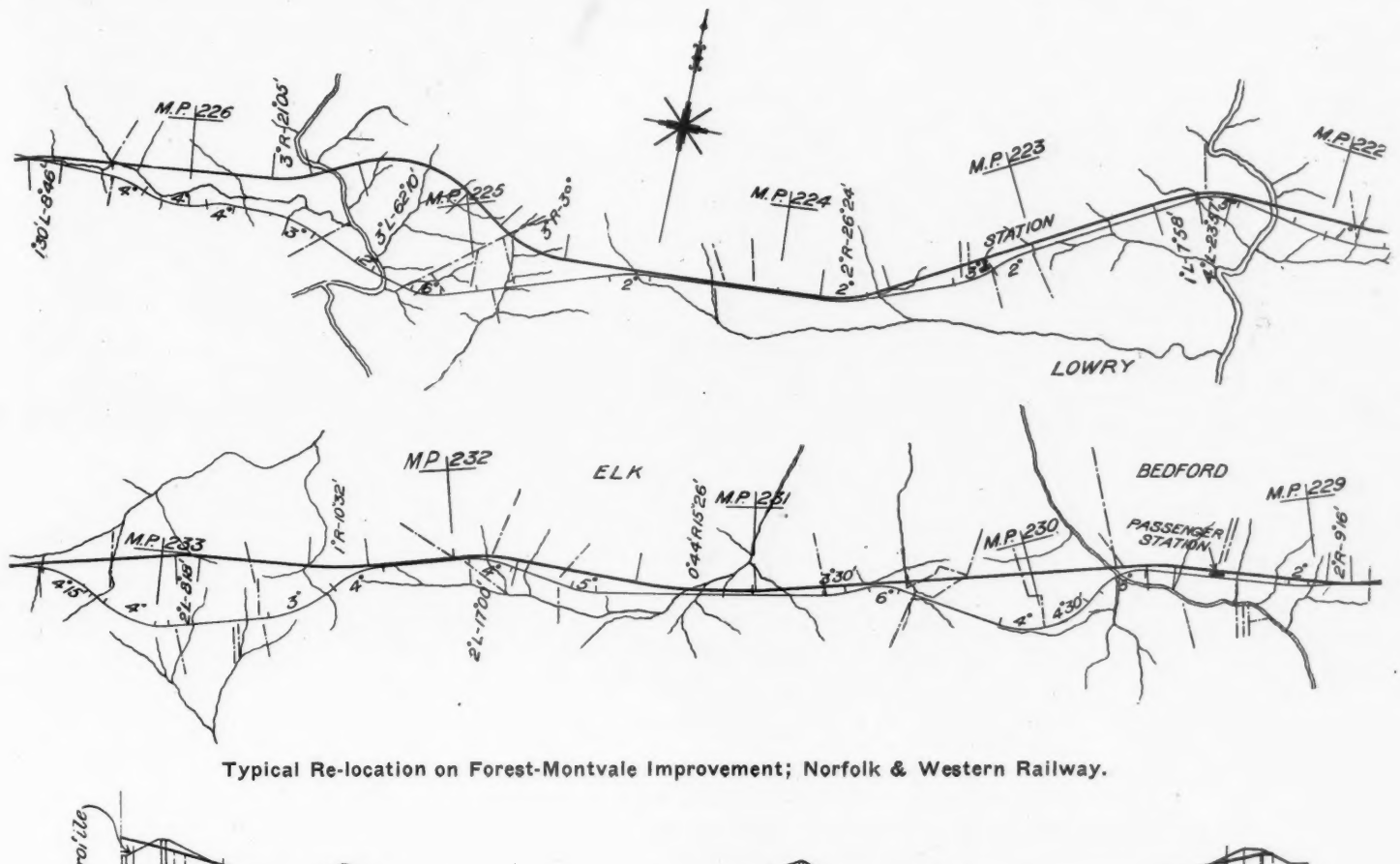
The Norfolk & Western is, then, essentially a coal road and serves a territory in which are located the richest veins of the world. The center of this territory lies in the heart of the mountains of West Virginia, on what is known as the Pocahontas division of the road. It is here that probably 62 per cent. of all of the tonnage hauled by the road originates.

So, too, this particular district stands pre-eminent in coal. Tonnage is obtained all along the line west of Roanoke. There are a few anthracite mines west of that place on the Radford division, with quite a large operation at Christiansburg. There are also a number in the Clinch Valley which really produce a Pocahontas coal. Next to this comes the great Pocahontas field itself, followed by the Tug river, then the Thacker and Kenova, while in Ohio there are two operations.

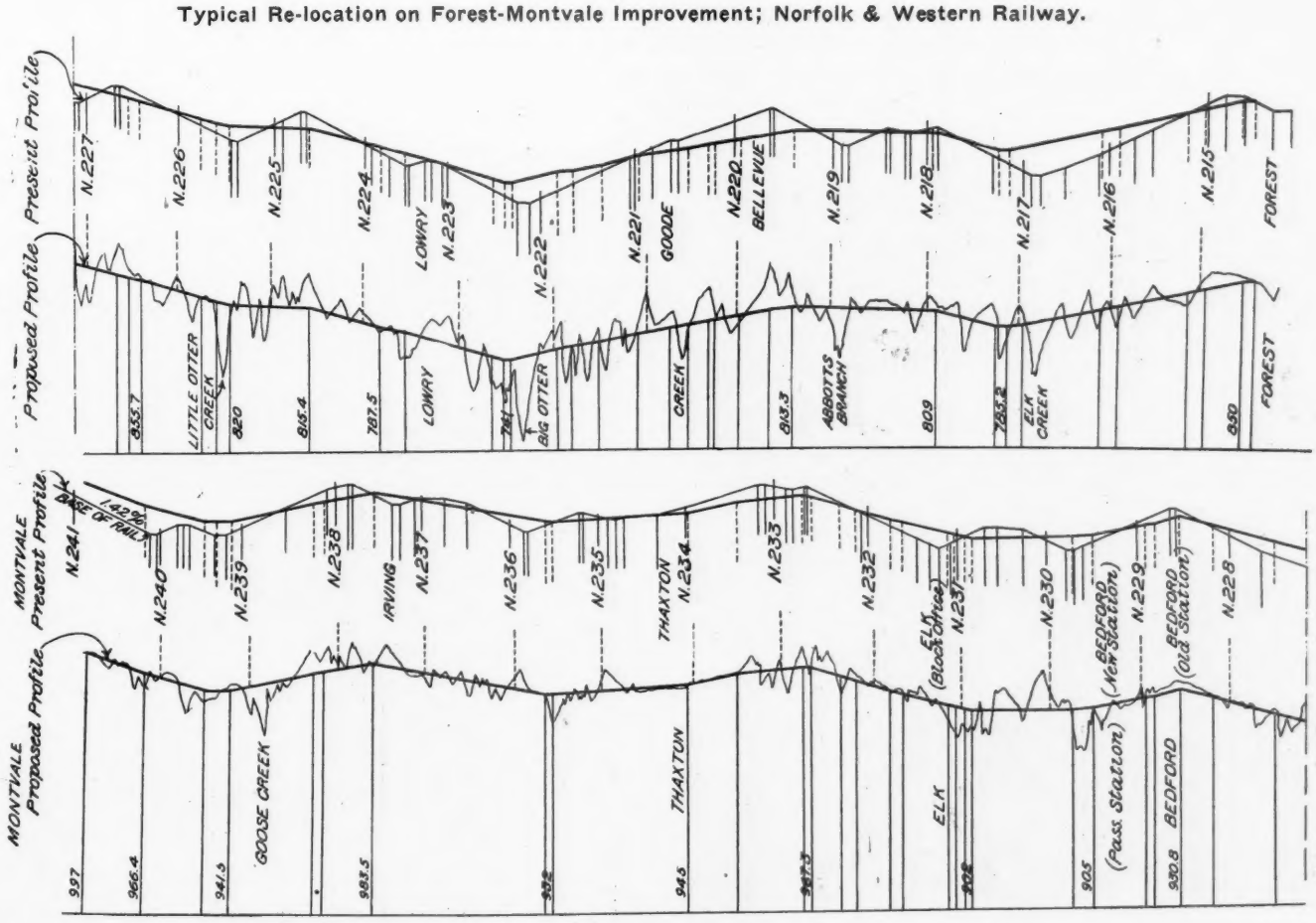
Divided by districts, the number of operations served by the Norfolk & Western is as follows:

District.	No. of operations.	Shippers of
Radford (Va.)	8	Coal.
Clinch Valley.	28	"
Clinch Valley.	2	" and coke
Pocahontas ..	11	"
Pocahontas ..	51	" and coke
Tug River...	16	"
Tug River...	1	Coal and coke
Thacker	26	"
Kenova ...	12	"
Scotio (Ohio)	2	"
Total	157	

There are thus 157 mining operations along the line, and as it frequently happens that from one to five or more mines are



Typical Re-location on Forest-Montvale Improvement; Norfolk & Western Railway.



Profile Forest-Montvale Improvement; Norfolk & Western Railway.

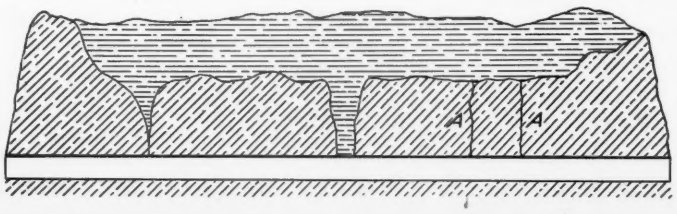
Cut near Bedford, Forest-Montvale Improvement; Norfolk & Western.

included in a single operation, it will be seen that these are many times greater than the figures given.

That portion of the railroad between Elkhorn tunnel and the Ohio river is within the boundaries of West Virginia, except in one case where it takes a short cut, by way of two bridges and a tunnel, across a bend of the Tug river, and thus runs for a few hundred feet in the state of Kentucky. The mining operations are not, however, wholly confined to West Virginia. From about 437 miles west of Norfolk, or near Glenalum station, the Tug river forms the boundary line between West Virginia and Kentucky, and here a number of operations have been opened along the heights on the Kentucky side. The output of these mines is comparatively small at present, but the properties are good and it is on the increase. Transportation across the river is by means of an aerial tramway reaching from the headhouse on the mountain to the tipple alongside the track, with spans ranging from 1,000 ft. to 1,500 ft.

As for the quality of the coal, it is, as already stated, among the best of the world, and the seams are remarkably free from impurities. The Pocahontas vein proper, or the one that is known

Trestle for Little Otter Creek Fill, Forest-Montvale Improvement; Norfolk & Western.



Typical Section of Rock Along New River; Norfolk & Western.

Tunnel on Laurel Branch, West of Pocahontas.

as the Pocahontas No. 3, is the richest and thickest. It ranges in thickness from 6 ft. to 12 ft., and an analysis shows it to be very high in fixed carbon, with from 15.75 to 19.5 per cent. of volatile matter; very low in phosphorus and sulphur, and with from 2.34 to 9.5 per cent. of ash, with an average of about 6 per cent., and it has a heat content of about 15,000 British thermal units.

The Pocahontas seams are the lowest, geologically speaking, and have a dip of about 50 ft. to the mile. As they disappear below the water the higher strata come to the outcrop to the west, and we find the Tug river and Thacker coals in the western part of the state. There is nothing in these fields that can compare with the great Pocahontas vein. The main Thacker seam runs in thickness from about 4 ft. 6 in. to a little over 5 ft., and is of a remarkable purity, though somewhat inferior chemically to the Pocahontas. An average analysis of this coal would be about as follows:

Moisture	0.41	per cent.
Volatile matter	36.33	"
Fixed carbon	58.09	"
Ash	5.17	"
	100.00	per cent.

There will be about 0.9 per cent. of the whole in sulphur and the heat content will be about 14,700 heat units.

With such coal as this along the line, it follows as a matter of course that the tonnage should be large and rapidly increasing. For the four fiscal years ending June 30, 1906, the total output of the several districts along the line is given in the accompanying table. From which it appears that, in four years, the total tonnage has increased 42.02 per cent. and the coke tonnage 42.25 per cent:

Statement of Coal and Coke Production, N. & W. Ry., by Districts for the Years Ending June 30 (net tons).

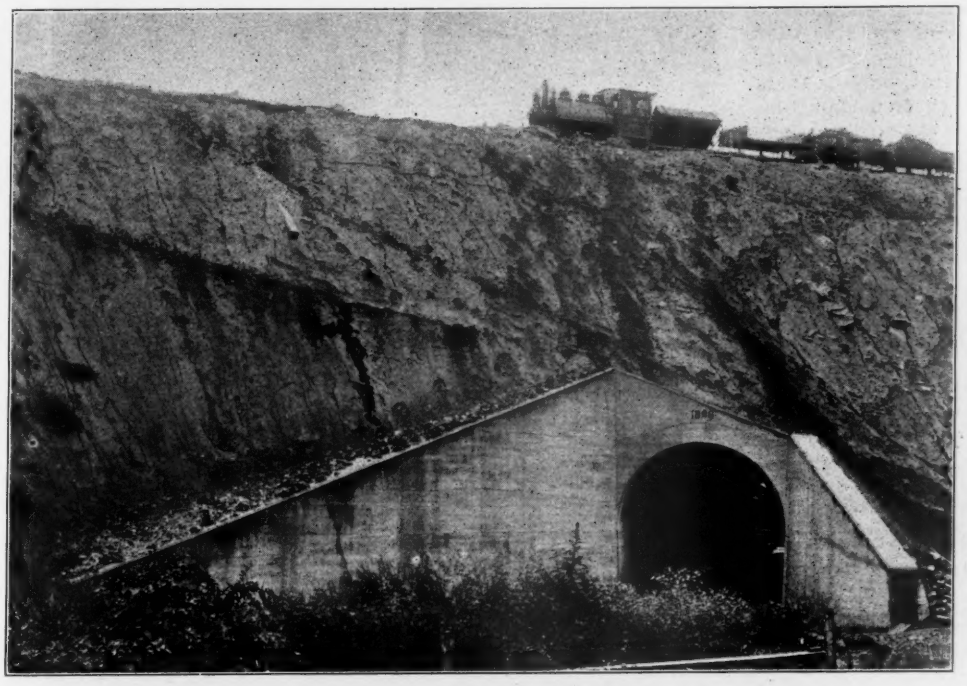
		District					
		Pocahontas.	Tug River.	Thacker.	Kenora.	Clinch Valley.	Total.
1903.	Coal	5,560,735	230,134	884,392	84,099	868,322	7,627,682
	Coke	1,288,307	12,753	.....	.....	341,219	1,642,279
1904.	Coal	5,652,540	394,280	1,267,129	78,809	737,248	8,130,006
	Coke.	1,432,462	6,443	.....	.....	262,417	1,701,322
1905.	Coal.	6,809,887	556,154	1,340,056	190,747	762,193	9,659,037
	Coke.	1,751,877	52	.....	.....	213,221	1,965,150
1906.	Coal.	7,499,523	802,750	1,678,901	368,364	788,501	11,138,039
	Coke.	2,112,268	22	.....	.....	223,917	2,336,207

The total tonnage carried in the year ending June 30, 1906, was 19,266,534, of which 11,875,300 was coal or coke, or about 62 per cent. of the whole. The road has, therefore, a very good reason for its existence; and this is still further emphasized by the graphical representation of the annual coal and coke production of the Pocahontas field from 1883 to 1906, inclusive, as compiled by John J. Lincoln, Chief Engineer of the Crozier Land Co. In this it is shown that the coal production rose from 60,828 to 6,706,008 gross tons, and the coke production from 19,805 to 1,846,643 gross tons, or an increase of more than a hundred-fold.

From an engineering standpoint the road traverses a territory as widely different as its products. Starting at sea level it first crosses the northern part of the Great Dismal Swamp and the low ground of eastern Virginia; then rises to a height of about 1,280 ft. in its passage of the Blue Ridge mountains; dropping thence into the valley of the Roanoke and rising again to 2,040 ft. in its passage of the Alleghanies. It then follows the New river for a few miles, and finally plunges into the wilds of West Virginia, where it rises to a height of 2,560 ft. at Bluefield.

The reason for the first location of the road has already been discussed, and the necessity for the improvements that are being made was based upon the inadequacy of the original construction to take care of the constantly increasing traffic that was offered. While not in the chronological order of the work as it was undertaken, it will be convenient to consider what was done on the line from east to west.

At the tidewater terminal we have the Lambert's Point wharves that were described in



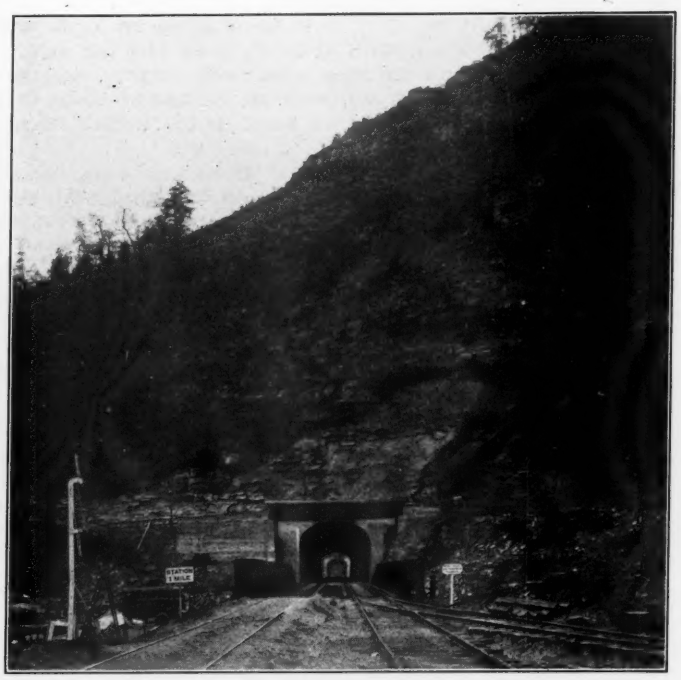
Abbott's Creek Arch, Forest-Montvale Improvement; N. & W.

Laurel Branch, near Pocahontas; Change of Creek Bed Saves Two Bridges.

the *Railroad Gazette* for July 24, 1903, to which merely minor improvements have been added since that time. At South Norfolk a large receiving yard is in course of construction, which will be described in another place.

Moving west, the first large undertaking that is encountered is that of the construction of a low-grade line around the south side of the city of Lynchburg, from Concord to Forest. Under the present conditions the single-track line passing through Lynchburg, with the heavy grades upon each side of the city as the road drops down from the heights to the level of the James river, is the limiting point of the traffic and the place where congestion is most apt to occur. In order to meet this difficulty, and, at the same time obtain a better grade and alinement, the detour about the city has been planned and is about 43 per cent. completed.

As already stated, this detour starts from Concord, about 14 miles east of the Lynchburg station, and turning to the south, remains on the high ground until the city is passed, and it reaches the main line again at Forest, about 11 miles west of Lynchburg station, as measured on the present line. On this detour the maximum curvature is fixed at four degrees, and the ruling grade for eastbound traffic will be 0.5 per cent. as against 1.25 per cent., including curve resistance on the present line. For westbound traffic the maximum adverse grade will be 0.7 instead of the 1.45 per cent., including curve resistance of the present line. It will be seen from the profile that is shown of this work, that the excavation required is very great; in fact, for the 22 miles of the line the excavation amounts to 2,625,000 cu. yds., or at the rate of about 120,000 cu. yds. per mile. The greater portion of this work is that which can be done with the steam shovel, but as Lynchburg is approached from the west the rock comes closer to the surface, and where the cutting is more than 15 ft. in depth blasting is required.



Tunnel No. 1 near Welch, W. Va.

Norfolk & Western Railway near Antler, West Va., Showing Old and New Main Lines.

The estimated cost of this portion of the work of improvement is placed at $2,485,000.

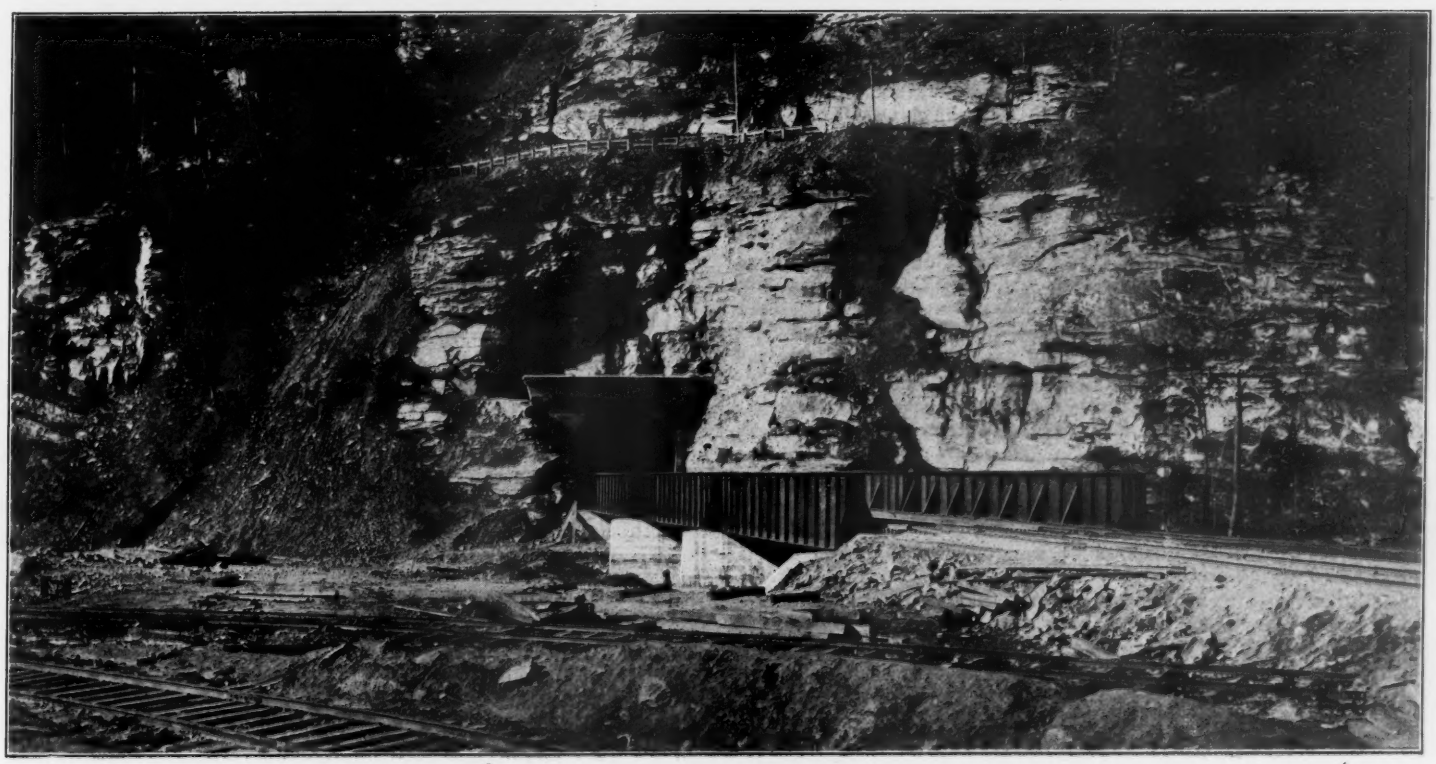
The value of such a detour as this can be readily appreciated in that it will afford a low-grade double-track passage around the city of Lynchburg for all freight traffic, and thus not only reduce the cost of haulage, but make it possible to maintain a faster schedule. In this connection the experience of the road in the construction of the Big Sandy line will be of interest.

This is built down the banks of the Big Sandy from Naugatuck to the Ohio, and was, as stated, for the purpose of relieving the congestion of traffic on the old line. It was found that at the end of the first year of its operation the saving that it had effected amounted to $237,912, and for 1906 it is estimated that it effected a saving of from $300,000 to $350,000 in comparison with what would have been the cost of hauling the traffic over the old line, even though that could have been done. This line cost $4,939,724, and it has made it possible for the road to handle far more business than could have been done over the old line.

Big Otter Creek Viaduct, Forest-Montvale Improvement; N. & W.

Tunnel No. 2, near Welch, W. Va., Norfolk & Western, Showing Old and New Tracks.

Old and New Main Line at Antler, West Virginia; Norfolk & Western.



Old and New Tracks at Short Creek; Norfolk & Western.

In fact, the relief was so noticeable at first that, shortly after the line had been put in operation, the manager received a call from the representative of the engineers asking for a change in the running arrangements for the men, on the ground that business had fallen off to such an extent that they could not make full time. He was told that not only had business not fallen off, but that it had very perceptibly increased, and that the reason for the apparent fall was that the crews were getting over the road in from ten to twelve hours, instead of twenty.

Immediately west of Forest, where the detour joins the main line, there is a section that is being double-tracked as far west as Montvale, 27 miles. Although this is called double-tracking, it is really the construction of quite a new line, and for the greater portion of the way is of an entirely new location. Sometimes it uses the old right of way, and again it is removed from it some distance. Two characteristic sections of the line are shown in which the old line is represented by a fine, and the new location by a heavy line. In this the maximum curvature is placed at four degrees, and the maximum grade against eastbound traffic is 0.5 per cent. and 0.7 against the westbound, all compensated for curvature, or the same as that maintained on the Lynchburg Belt Line and Connecting Ry. above referred to.

The excavation throughout nearly all of this piece of work is steam shovel work and amounts to 3,277,000 cu. yds., and it is estimated that the cost will be about $2,625,000. In this revision, the shortening of the line will be comparatively slight, but the advantages will lie in the straightening of the alinement by the elimination of sharp curves and the reduction of the opposing grades to east and westbound traffic from about 1.48 per cent. to the figures given. The profile and the photographs of this part of the line, as well as those of the Lynchburg line branch, will give a fair idea of the general character of the work.

With this work completed and a double track down, the capacity of the road will be greatly increased, and the necessity for double-heading through the whole section of which Lynchburg is the center will be entirely avoided. The next point to the west where important improvements are under way is at Roanoke, where the final work is being done on the great yard. This, with the other yards at Bluefield, Williamson and Portsmouth, is a matter of such magnitude that the system of yards for the whole road will be treated separately, and in a future issue.

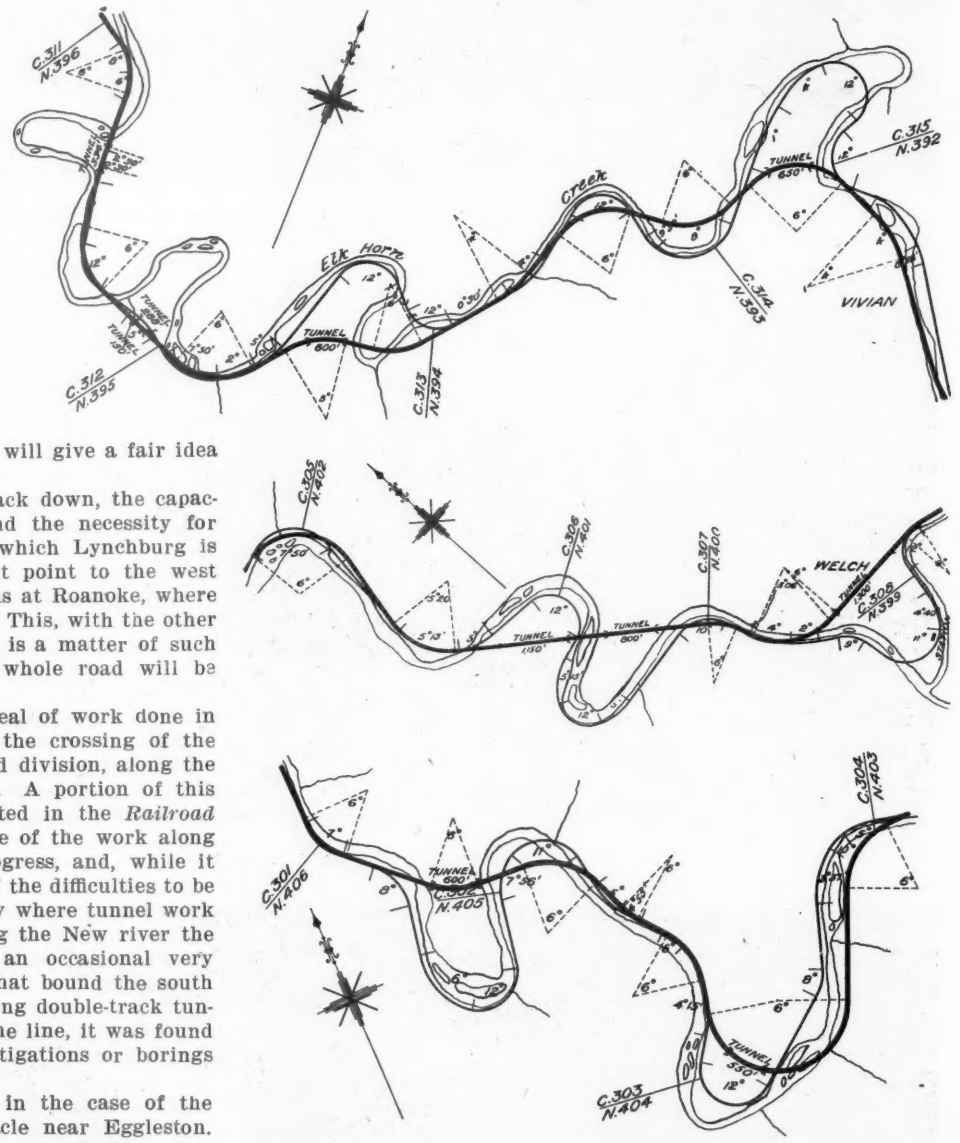
Beyond Roanoke there has been a great deal of work done in the straightening of the line, commencing at the crossing of the Alleghanies and continuing on over the Radford division, along the New river and on the East river to Bluefield. A portion of this work has already been described and illustrated in the *Railroad Gazette* for October 2, 1903. At that time some of the work along the New river was under contract and in progress, and, while it was known to be difficult, the full significance of the difficulties to be encountered was not fully appreciated, especially where tunnel work was concerned. In the original alinement along the New river the banks had been closely followed, with only an occasional very short tunnel through the limestone pinnacles that bound the south side. When it came to driving comparatively long double-track tunnels through this rock in the straightening of the line, it was found that no dependence could be placed upon investigations or borings in the matter of the stability of the cover.

A marked sample of this is to be found in the case of the new tunnel that was driven through a pinnacle near Eggleston. The original line had followed the river bank and cut through a spur by a short tunnel, as shown at the right of the engraving. This has now been abandoned for the one through which the rails are run, and by which a straightening of the line was effected. In the construction of this tunnel, however, unexpected difficulties were encountered. The cover was apparently a considerable thickness of rock, with a hill of earth above, that was practically a series of clay pockets filled in between the ridges and pinnacles of the limestone rock and rising to a height of about 125 ft. above grade. At a short distance back of the western portal, the bore struck the lower part of a pocket and there was a cave-in that crushed all timbering that could be used, and so the material from this funnel-shaped pocket reaching to the top of the hill about 200 ft. across, had to be taken out through the portal.

A similar cave-in, at another tunnel that is being cut a mile or so west of this, has occurred near the center, with only 90 ft. between the ends of the completed tunnel lining at the time of the fall, and this is now being removed by steam shovels from each face and by excavation from above. Again, at Pembroke the whole face of a mountain into which a cut-off tunnel was being driven, came down and buried the portal. The debris was removed and a stone portal built.

The immediate cause of these cave-ins is the seamy character of the rock. This is illustrated by a typical diagram in which a pocket of the earth cover is shown extending nearly down to the tunnel line. Such a pocket as this can, of course, be detected by systematic borings, but such seams or cracks as are shown at A A cannot be found unless a core drill is used and this happens to strike exactly on the line of one of these cracks. The result is that when the heading has been driven into the apparently solid rock between two such defects, the whole roof comes down, and with it the superincumbent water-saturated earth. For mutual protection the contracts for work in these pinnacles along the New river are drawn so as to protect both the contractor and the railroad company for all extra yardage resulting from this disintegration in the form of unavoidable falls, contractors being paid ordinary excavation prices. In these cases the material was used in building high double track fills along the river bank near the tunnels.

While trouble has not been experienced to the same extent in

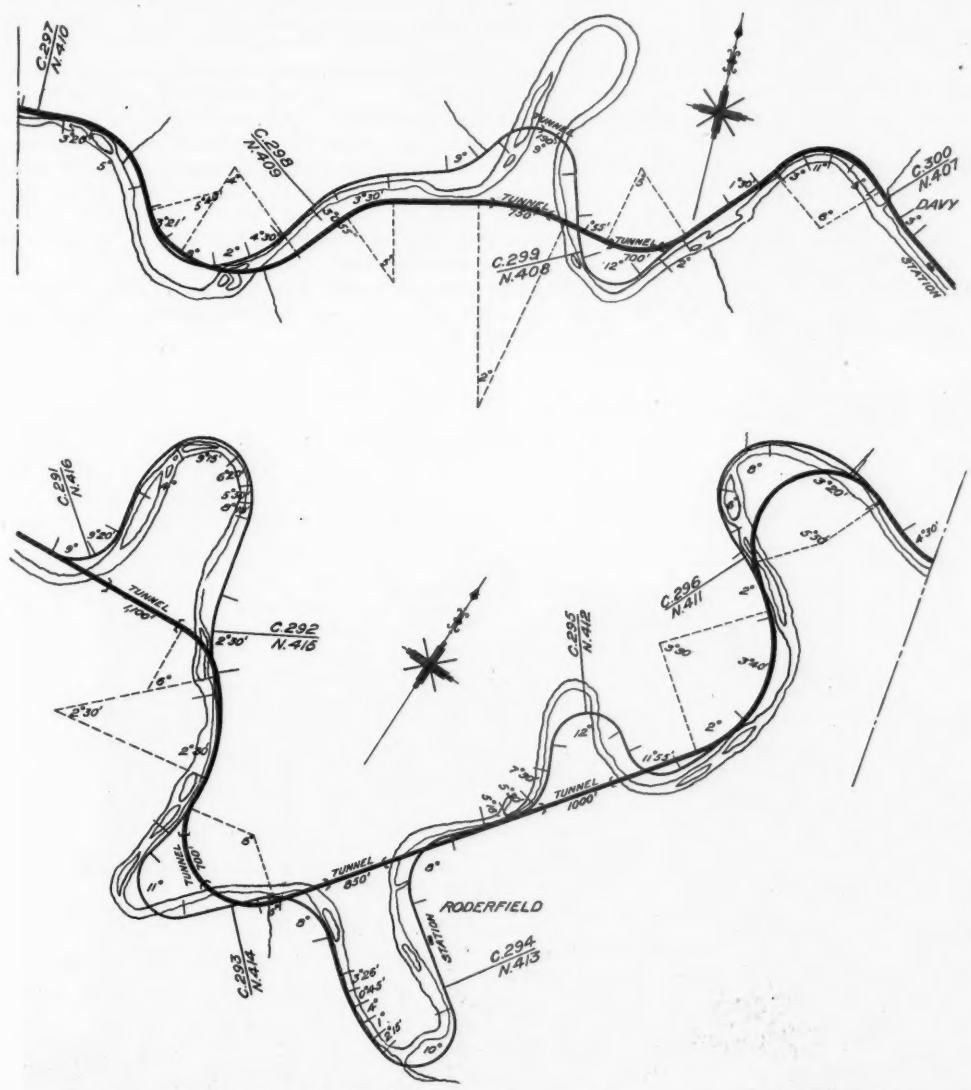


Re-location Between Vivian and Davy; Norfolk & Western.

West Virginia, still all through the mountains the rock is readily disintegrated and comes down in small fragments after a shot. This will be seen by an examination of the reproductions of the photographs of the several pieces of rock work along the line, and is especially noticeable in the case of that of the cut near Keystone, W. Va. The work is a sort of shaly sandstone associated with the coal measures, and while it stands well in cuts, it scales off continually and comes down into the ditches and, in the tunnels, needs lining in order to protect the track; although there is little danger of its coming down in large pieces or quantities, as in the case of the rock along the New river.

The character of the country through the West Virginia mountains is such that the line of cheapest construction, following the banks of Elkhorn and the Tug river down to the junction of the latter with the Big Sandy, is exceedingly crooked. The mountains, while not rising to a great height above the stream, are very steep and are a succession of saw-tooth ridges, separated by narrow valleys or hollows at the bottom of which there is usually a stream. The original alinement followed all the bends

and turns of the river, with only an occasional tunnel, where the curvature would have been so excessively sharp as to exceed working conditions. The grades were easy and in favor of the westbound traffic, which is that predominating west of Welch, or 36 miles west of Bluefield, the assembling point of the eastbound traffic. At about this point the road enters a district of the Thacker coal fields, whose market is mostly in the west, while the greater portion of the Pocahontas coal goes to the seaboard and eastern points. It is a case of traffic following the lines of least resistance, and though large quantities of coal are taken out west of Welch, it is between that point and Bluefield, or rather Bluestone, 11 miles further west, that the center of the coal and coke industry



Re-location of Norfolk & Western Railway Between Davy and Roderfield.

may be said to be located, and from this center it moves in both directions, east and west.

It is along this exceedingly crooked line between Welch and Naugatuck, or rather between Vivian and Naugatuck, a distance of 92 miles, that much of the work of straightening has been done and is in progress, sections of which are shown to illustrate the character of the change of alinement that has been undertaken. In these the heavy line indicates the new and the light line the old alinement.

At Vivian there is an assembling yard for westbound traffic. It is small, and no attempt is made at classification. Starting at this point the old line follows Elkhorn creek in nearly all of its windings down to its union with the Tug river at Welch. The new line, in the first four miles of the distance, will cut across five bends of the creek that are now followed, and in this distance adds two tunnels and shifts the center of a third, and requires five new bridges across the stream. The amount of excavation required, including that for bridges and tunnels, in the 7 miles to Welch, is estimated at 458,000 cu. yds., and the cost is placed at $1,260,000.

At Welch there will be another cut-off, with a tunnel 1,300 ft. long beneath the upper portion of the town, beyond which the line will join the already completed section to Davy, in which there was 722,400 cu. yds. of excavation, and which cost $1,543,000, inclusive of the bridges and tunnels. It will be seen from the map that after leaving Welch the road strikes across two bends of the river on a tangent, upon which there are three bridges and two tunnels, the latter being 800 ft. and 1,150 ft. length, respectively. The curvature for this distance is entirely eliminated, and the new line crosses the old at nearly right angles as it emerges from one tunnel to enter the bridge between the two. This also appears on the reproduction of the photographs. Between Davy and Thacker, a distance of 49 miles, it is estimated that there will be required 1,900,000 cu. yds. of excavation and this double-track will cost $5,140,000. For the greater portion of the way there will be little or no change of alinement, but in certain places the plans call for the construction of practically a new line. An instance of this is shown on the section of the map from Davy to a short distance beyond Roderfield, at milepost 416. In this distance of nine miles there will be six tunnels, with an aggregate length of 5,100 ft. and ten bridges. This is, to all intents and purposes, a new line, and contains at least one repetition of the scheme of the work near Welch, where there is a tangent location near Roderfield involving three bridges and two tunnels of 1,850 ft. total length in a distance of a little more than a mile. To the east of this the line is thrown across the river at a wide divergence from the original, as shown both on the map and the reproduction of the photographs of the work in progress near Antler.

In this distance of 49 miles from Davy to Thacker there will be 16 tunnels with an aggregate length of 13,000 ft. and ten bridges. The bridges will all be in the first nine miles west of Davy and on that portion shown on the engraving. West of Thacker there is no exceptional work as far as Naugatuck, except at Williamson, where the large yard is being built, part of which is already in service. The double track on the improved line is now in operation between Thacker and Naugatuck.

The main object in the expenditure of these large sums of money in securing a change of alinement is to obtain a line upon which passenger trains can be run with safety at high speed and freight trains be handled with less resistance and delay. Very little improvement was possible in grade, nor was this essential, as the descent of the present line is in the direction of loaded traffic; but the amount and rate of curvature has been greatly reduced. On the old line 12-degree curves were in use, and those of eight degrees were quite common, whereas on the new alinement a six-degree curve is the maximum, and in many cases it is much less. With this, train resistance will be greatly lessened, and it will be possible to increase the maximum tonnage rating accordingly. The grade along this section of the road is that of the drop of the Tug river, and averages about 0.40 per cent., with a range of from 0.125 to 1.00 per cent. along the upper portion, and an average of about 0.07 per cent. at the lower, where the grades do not rise above 0.10 per cent.

When this work of improvement was undertaken it was estimated that it would be carried on at an expenditure of about $1,500,000 annually, and that this amount would keep the road up to all of the requirements of its rapidly increasing traffic. But the output of coal and coke has increased so rapidly in recent years, and the facilities for its transportation have been so taxed to the utmost, that it has been necessary to greatly exceed this rate of outlay. In this the object kept constantly in mind has been, not the securing of an immediate relief to meet present necessities, but a permanent betterment of the property, so that what is done shall be final and of such a character as to require the minimum expense for maintenance and place the road to take care economically of whatever traffic may be offered in the future.

(To be continued.)

The Wide-Awake Station Agent.*

Cultivate the power of observation. It may be difficult at first but never let up, no matter where you are. I had a car clerk that could come through the yard sound asleep. At least I could never find out what he knew if awake. I have found it a common failing that new men in this work are prone to look for just one car and see nothing else.

I have in mind, though, a little fellow left to hustle for himself and everlastingly bobbing up around the station in unexpected

*From a paper by C. R. Henderson in the *North-Western Bulletin.*

places, who could keep tab on "who was braking for Jones" and "whose caboose they had out last trip" or "what train took that steel." He was all eyes. He is keeping a busy yard straight today, and I daresay that some day he will keep more than a yard straight. Did you ever try to see just how much you could notice of what was going on in your yard and then recall it all when you got back into the office? It's a big help. After a while there will be very little going on that you will not be right onto. And you're the man that's responsible, you're the man on the ground and should know how and will be called upon to explain. It's better to be able to see for yourself, otherwise they'll soon be saying, "Oh, he'll never know the difference." I don't suppose that we have any idea how much improvement it makes when they learn by experience that your eyes are open. Let careful observation be your method and let it be so generally understood that no clerk or yardman can feel that it is personal.

On recently trying to impress on a man that if there are only two boxes of crackers in the car and they are placed crosswise they would in all probability tip over and one knock the cover off the other, I was told that this rule applied only to cases of eggs. There it was again. The old general method to apply instructions, word for word, and go not a step farther.

We receive, say a letter from Mr. Richards, relative to a certain shipment. Does it not pay better than to just answer the questions or give him our record forms, to see the consignee and get at the bottom of the thing? It may change the situation entirely and save the company a few dollars besides. It is those things we rate as little ones that so frequently surprise us when investigated. When the special agent comes along, he doesn't take anything for granted; the warehouseman may have checked "one short," but he goes to the man's store just the same and finds the box.

Bear in mind that the men all want something better. Be their friend and give them a boost when you consistently can. If you cannot give a man a promotion when a vacancy occurs try to explain to him in a way that he will appreciate. It will not only keep him from getting grouchy, but if he is the right kind of material he will immediately "get busy."

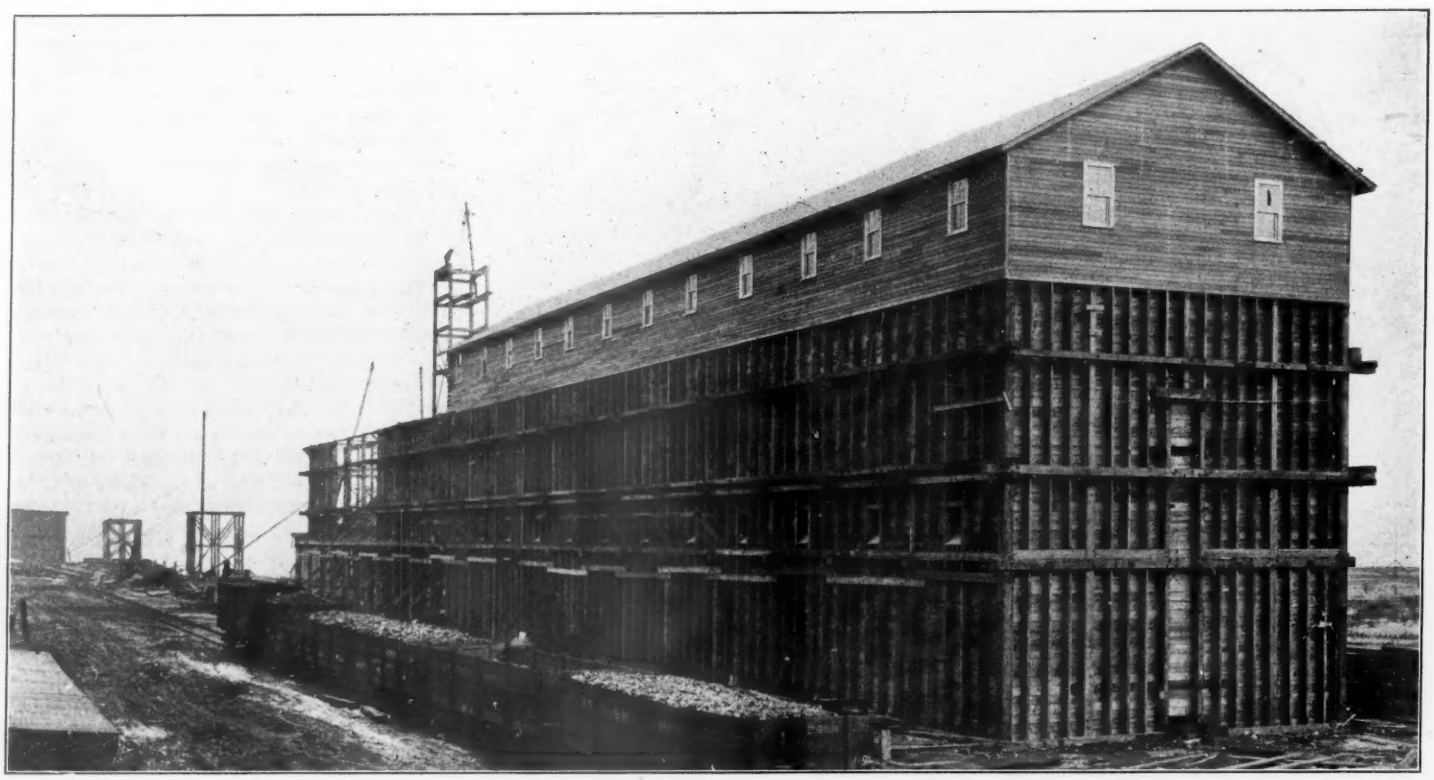
We should beware lest we find ourselves agreeing with the public in their various criticisms. They are wont to heap abuse on the railroad and they will think a whole lot more of you if you take your stand and be loyal. Be careful and use tact with the public. Nothing will drive a man away quicker than the use of disrespect. Always make it a point to have time to give him polite and courteous treatment. While the information wanted may appear trivial to you, it's much to him. And the busier you are, the more he'll appreciate it. While I regret to say it, I honestly believe that the public get shorter and more indifferent answers in the railroad service than they get in any other business. They altogether too frequently get snapped up in a manner that fairly takes their breath away. I have heard it and so have you.

South Boston Coaling Station of the New York, New Haven & Hartford.

One of the largest locomotive coaling stations in the United States is being built for the New York, New Haven & Hartford at Northern avenue and B street, South Boston, Mass. The storage capacity of the main pocket will be 13,000 tons. A wharf 40 ft. wide and 480 ft. long has been built, and on this wharf, running its entire length, is to be a trestle 20 ft. wide and 30 ft. high, of heavy timber construction. Several of the trestle bents can be seen in the accompanying progress view of the plant taken February 15. Coal from the Virginia fields will be received by vessel, and two Mead-Morrison Boston type unloading towers will be built on the top of the trestle and arranged to traverse its entire length, for convenience in unloading these vessels. The coal will be removed by means of Rawson grab buckets dumping into a small hopper in each tower. From the hoppers the coal will be discharged to three-ton cable cars running on the trestle. One of the towers will have a movable crusher so that coal may be crushed or not as desired.

The central 250 ft. of the trestle contains bins holding 500 tons. These bins will have gates and chutes to enable coal to be discharged directly from the cable cars into the bins and thence to a train of gondola cars standing on a track on the wharf. A car haul is provided for moving the cars while being loaded.

The main storage pocket, which is shown in the photograph, is 379 ft. long and arranged for overhead and under storage. Between the wharf and the main pocket will be a steel bridge of 175 ft. clear span and 46 ft. of trestle. An endless cable railway extends the entire length of the wharf, across the bridge and over the entire length of the storage pocket. This railway will transfer the coal from the unloading towers to the shipping bins, or carry it across the bridge and distribute it in the overhead storage compartment of the main pocket.



Construction View of South Boston Coaling Station; New York, New Haven & Hartford.

The lower part of the main pocket is enclosed and forms a large ground storage space. Coal is discharged into this space through openings controlled by rack-and-pinion gates in the floor of the overhead bin. At the center of the main building is a Holmen elevator, and underneath the ground storage in each end of the building is a conveyor system. Coal may therefore be removed from ground storage by the conveyors, discharged to the Holmen elevator, and transferred to the cable cars overhead, by which it may be redistributed in the overhead bin or transferred to the shipping bin on the wharf.

The plant will be complete in every respect. A large power house will contain two 125-h.p. Atlas boilers, and a 50-h.p. cable-road engine, a pump, etc. At the center of the main building will be the hoisting engine for the elevator and the driving engine for the re-handling conveyors. The plant was designed and is being built by Roberts & Schaefer Co., Consulting Engineers and Contractors, Chicago.

Track Deformations and Their Prevention.*†

BY G. CUENOT,
Chief Engineer of Bridges and Ways for the Board of Control of the Paris, Lyons & Mediterranean Railway.

The question of the proper length to be given to cross ties has been before the American Railway Engineering and Maintenance of Way Association for the past two years, and, doubtless, the same question has been presented to maintenance of way officers by the managers of their companies in the hope of buying at less cost an article of supply which is ever increasing in price, and at the same time is such a necessary part of the construction of a railroad.

Up to the present time, the problem has not been very scientifically treated in the United States, and there is some divergence of opinion relative to the matter, usually based on the practice under which the individual expressing it has grown up.

Upon reading the account, therefore, of Mr. Cuënot's painstaking experimental work, it occurred to the translator that the description and results would be interesting to the English speaking engineers who are occupied with such questions in their own work, and he therefore made arrangements with the author for introducing the work to them. The author has been very kind and liberal in the transaction, by reason of his truly professional and scientific spirit, and the translator takes this opportunity for expressing his appreciation.

American engineers can learn a lesson for themselves from the scientific spirit and great care with which their foreign colleagues attack a problem to be solved and carry on the work of investigation and experiment.

W. C. CUSHING.

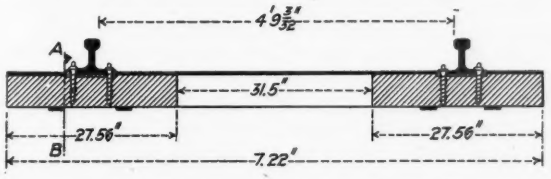


Fig. 1- Transverse Cross Section on C-D.

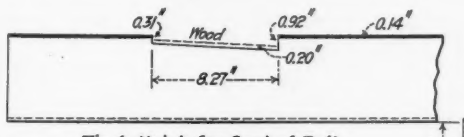


Fig. 4- Notch for Seat of Rail.

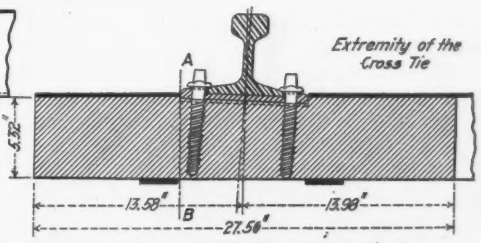


Fig. 2- Longitudinal Cross Section.

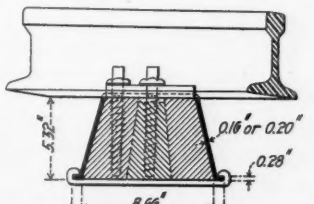


Fig. 2- Cross Section A-B with Block of 3 Wedges.

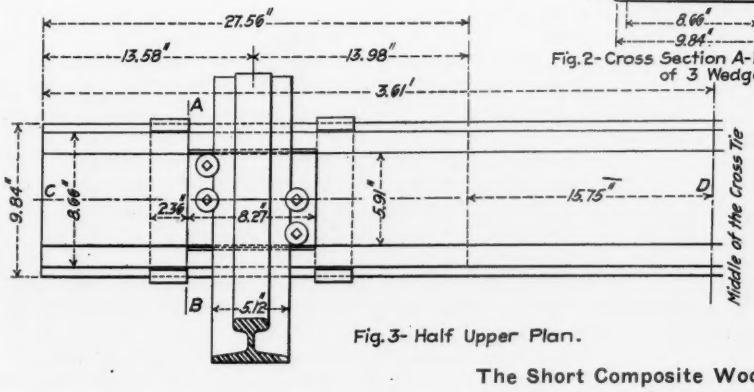


Fig. 3- Half Upper Plan.

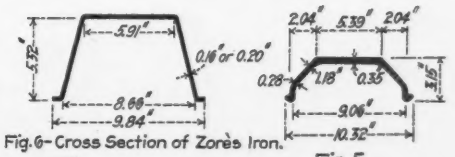


Fig. 6- Cross Section of Zorès Iron. Fig. 5.

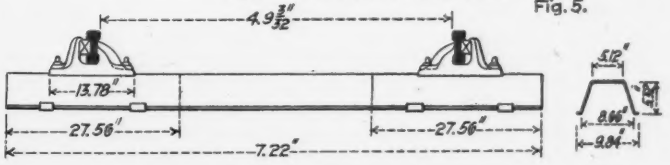


Fig. 7- Track with Double Head. Fig. 8.

The Short Composite Wood and Steel Crosstie.

NATURE AND OBJECT OF EXPERIMENTS.

The Minister of Public Works expressly charged me with experimenting with a composite cross tie (wood and steel), and to make him a report on the result of the experiments. I did not believe that it was sufficient to place a cross tie in the track and to observe the manner in which it behaved. It seemed to me that, in order to discuss with some competence the results of the experiments, it was necessary to examine what takes place in the case of a normal track provided with ordinary cross ties or with steel cross ties employed on the State System, and to compare the results obtained with those which were found in the case of the same track provided with composite cross ties.

It was a question then of a collection of tests bearing on all the movements to which the track is submitted, and of the study of all the deformations to which it is subjected. The manner in which the fastenings behaved, with the systems tried, ought also to have my attention; it was interesting to give an account whether or not the methods of fastening (employment of treenails) would be able to render the service on which one has a right to count. The outline of the study, which we have undertaken, comprises nearly all the questions concerning the track, including the joint, which has given occasion for numerous solutions.

It has been possible up to the present time to study the influence of reinforcement of the track by the enlargement of section of rails, of screw fastenings, and of rail joints, but I do not believe that any one has, up to the present, examined the influence of a stronger section given to the cross tie. This study presented then, apart from the special mission which had been intrusted to me, a general interest which I immediately recognized, and which will, without doubt, justify the relatively important work which I have done.

The rails employed were of the type used on the Paris, Lyons & Mediterranean, either the P. M. type of a weight of 39 kilograms per running meter (78.6 lbs. per yd.), or the P. L. M.-A. type, of a weight of 34½ kilograms per running meter (69.5 lbs. per yd.).

The rail joint was made up of angle bars. The screw spikes, No. 6, had a diameter of 20 millimeters ($^{51}/_{64}$ in.). Between the rails and the cross ties are metallic plates of the type used on the P. L. M.

CROSS TIES TESTED.

All my experiments, during nearly three years, have been made, first on a side track, then on track No. 2 of the line from Mouchard to Bourg, traversed by the express and fast trains, comparatively with oak cross ties employed on the P. L. M. system, and with composite cross ties (wood and steel). Finally, a special track for experiments was laid at the Bourg station, and there was tested, at the same time as the two types of cross ties recited, the metallic cross tie in use on the State System.

But before making these tests known it is essential to describe the cross ties employed.

The wooden cross ties of wood were oak, creosoted, and of the following dimensions:

Length	2 m. 60 (8 ft. 6.36 in.)
Width	0 m. 22 to 0 m. 25 (8.66 in. to 9.84 in.)
Depth	0 m. 14 to 0 m. 15 (5.51 in. to 5.91 in.)

Composite cross tie, system of Devaux, Michel and Richard.—This is composed of a metallic skeleton in the form of an inverted trough, provided in the interior with two symmetrical blocks of wood solidly fixed, and leaving between them an empty central space.

The upper surface of the skeleton presents, on removal of the track, two rectangular openings, leaving exposed on the blocks the seatings intended to receive the supporting plates for the rails. It is at once seen that this plan of cross tie permits the use of ordinary screw spikes as the method of fastening for the rails.

The metallic skeleton is of the type of iron section known in commerce under the name of Zorès iron, as the section ab shows it. The trapezoidal section is of interior dimensions:

Width at base	0 m. 22 (8.66 in.)
Width at top	0 m. 14 (5.51 in.)
Depth	0 m. 135 (5.32 in.)

The thickness of the metal ought to be 5 m/m ($^{13}/_{64}$ in.) but in reality it is only 4 m/m $^{6}/_{10}$ ($^{3}/_{16}$ in.), and the total length is 2 m 50 (8 ft. 2.4 in.). In later experiments the length was reduced to 2 m 20 (7 ft. 2.64 in.). The side walls terminate in a flange along the lower edges. The object of this arrangement, which is found in the greater number of metallic cross ties, is to render the

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†Authorized translation by W. C. Cushing, M.A., B.S., Chief Engineer of Maintenance of Way, Pennsylvania Lines, Southwest System.

cross tie better able to resist the blows of tools during tamping, to increase the moment of inertia in the vertical direction, and also to permit the clamping of the cross bars.

The metallic skeleton is provided in its lower part with four cross bars, two under each block. These cross bars are fixed without bolts or rivets, their extremities are simply curved and clamped on the flanges of the skeleton. Their object is to hold together the side walls of the metallic envelope, and to thus insure the wedging of the blocks in the interior of this envelope. The metallic part weighs about 60 kilograms (132.28 lbs.).

Each wooden block is composed of three wedges joined together, whose dimensions are given by the sections ab and CD.

The rails are fixed on the blocks through the intermediary of a plate with shoulder, by means of ordinary screw spikes. The supporting surface of the plate is inclined at $^1/_{20}$ in order to give the desired inclination to the rail, and the mortise is made in such a way that the plate should be well supported on the exterior side of the track by the corresponding edge of the notch in the metallic skeleton in order to oppose, in case of need, all lateral movement. The object of this arrangement is to prevent the spreading of the track, to which there is a tendency on curves.

The heads of two screw spikes of each middle wedge press the rail on the cross tie, and ought to act strictly as an adjusting screw on the middle wedge; for this effect a play of about 10 m/m ($^{35}/_{64}$ in.) is taken up between the upper face of the wood and the bottom of the metallic skeleton.

This arrangement allows a strong pressure of the lateral wedges against the sides of the skeleton to be obtained, a pressure which the passage of trains only increases by reason of the reaction of the ballast, which tends to push up the blocks and press them against the lateral walls.

The three wedges as a whole form, under pressure, a true block, solidly maintained by the metallic skeleton and the cross bars, and under which one can tamp as under a wooden cross tie.

It has been recognized in the course of experiments that the wooden part was like a monolith; that the middle wedge once in place could no longer be pushed up, which, upon the whole, is an advantage, and inventors have substituted for the three wedges a single wedge pressed into the skeleton by means of cross bars, presenting, besides the advantages of the three-wedge system, a better supporting surface for the plate, and the possibility of employing the chair for track with double headed rail. This latter system offers, besides, easier methods of manufacture.

The length of either of the blocks is regulated by the conditions under which they distribute the pressure on the ballast; it is about om 70 (27.56 in.), a length which has been recognized as sufficient to assure the bed of the cross tie on the ballast.

The separate wedges of the blocks are cut by saw, according to patterns made with care, so as to fit exactly in the interior of the skeleton.

The shoeing (adzing and fastening the plates to the ties) can be done by machine by previously confining the blocks in a special matrix, which will hold them under the tools of the planers in the desired place and afterwards serve for drilling the holes for the screw spikes, by the aid of augers driven by steam.

The blocks weigh about 32 kilog. (70.55 lbs.), and the weight of the cross tie is nearly 78 kilog. (171.96 lbs.).

The steel cross tie used on the State System is shown in the section herewith. It is 2 m 50 (8 ft. 2.4 in.) long and weighs 58 kilog. (127.87 lbs.).

The various characteristics of the cross ties experimented with are summarized in the following table:

This cross tie is also 2 to 4 times as rigid as the steel cross tie of the State Railroads.

It is possible to give an account in another way of the difference in resistance of the beams considered. In fact, if the condition is imposed that their deformation be the same for a like force, that is to say, that they each take an equal elongation, it is found, by designating L this elongation, by R, R′, R″, the stress per unit of surface of these beams, E, E′, E″, the coefficient of elasticity of the material of which they are made:

$$L = \frac{R}{E} = \frac{R'}{E'} = \frac{R''}{E''}$$

whence is deduced, by representing by $\frac{I}{Z}$ their moment of resistance, which is inversely proportional to R:

$$\frac{E\,I}{Z} = \frac{E'\,I'}{Z'} = \frac{E''\,I''}{Z''}$$

To appreciate the difference of resistance of cross ties submitted to a like deformation, it will be sufficient to compare between them the products such as $E\frac{I}{Z}$, or else, if the resisting moment of the steel beam is taken for a term of comparison, it will be necessary to multiply $\frac{I}{Z}$ by the ratio $\frac{E'}{E}$. The following results are thus arrived at:

Comparative resisting moments of different cross ties supposed of steel.

Cross-tie of wood	36
Composite cross tie:	
In the armored part	87
In the middle and at the extremities	61
Right at the fastenings	60
Steel cross tie of the State	30

The part of the metallic skeleton cut out to permit fixing the fastenings on the wooden blocks, which is necessary for the placing of the plate, or the chair, is of short length, about 0 m 15 to 0 m 30 (5.91 to 11.81 in.). This weakening is compensated, and more, by the plate, or chair, which forms part of the armored beam.

The above results have been obtained while seeking the mean coefficient E of the armored part by the condition $EI = \Sigma\, ei$, E being the coefficient of elasticity of the two materials considered, I their moment of inertia, $I = \Sigma\, i$; and the neutral axis of the composite beam being determined by the condition that each element is stressed proportionately to its coefficient of elasticity.

The composite cross tie offers, then, in all its sections, a resistance superior to that of the steel cross tie of the State; it will then be stressed much less and will be more resistant, under much more advantageous conditions.

EXPERIMENTS ON THE SIDE TRACK AT BOURG-EN-BRESSE.

The object of these first experiments was to ascertain the stability of composite cross ties and observe the manner in which the blocks behaved. It was essential to be assured of these two points before placing them in a main track.

The metallic skeleton of the composite cross ties was made of soft steel coming from dephosphorized meltings, and its form obtained by hammering.

The blocks were cut with a saw from new cross tie timber, but from waste which could not be otherwise utilized. The elements of 50 composite cross ties were thus obtained; 46 were made of oak and 4 of beech. The wood was injected with creosote at the work shop of the P. L. M. Co., at the station of Perrache 2.

These 50 composite cross ties were placed in track 5 at the station of Bourg-en-Bresse. Their spacing, with three fastenings, two were exterior and one interior, was one meter (39⅜ in.), except at the joints of the rails, five meters long (16.40 ft.), where the spacing was reduced to 0 m 70 (27.56 in.) and 0 m 60 (23.62 in.).

1 Designation of the cross tie.	2 Resistance to extension, per cmQ.	3 Elongation to elastic limit, per cent.	4 Weight of the cross tie in kilos.		5 Width of surface, in cm.	6 Thickness in centim.	7 Length in meters.	8 Moment of inertia in cm.4.	9 Moment of resistance in cm.3.	10 Position of neutral axis in centim.*	11	12 Rigidity of the cross tie.
Oak cross tie	200	2		70 (154.3 lbs.)	22 (8.66 in.)	14 (5½ in.)	2.6 (8 ft. 6.36 in.)	5,030	718	7.0	7.0	503,000,000
Modulus of elasticity of wood: E = 100,000.												
Composite cross tie .. Steel.	3,100[1]	22	46 (101.4 lbs.)		..	..	2.5 (8 ft. 2.4 in.)	533	61	5.24	8.76	[5]821,000,000
								229[2]	29	6.05	7.95	[4]1,429,000,000
Wood	200	2	32 (70.5 lbs.)	78 (171.9 lbs.)	25 (9.84 in.)	14 (5½ in.)						
					..	..	1.4 (4 ft. 7.08 in.)	3,630	504	6.03	7.2	[3]1,066,000,000
In the armored part	.....	..	..	..	..	..	...	4,163	87[7]	5.90	8.1[6]	.....
In the middle	.....	..	..	..	..	..	...	533	61	5.24	8.76	.....
Right at the fastenings	.....	..	..	..	..	..	...	3,859	60	6.16	7.7	.....
State cross tie	3,000[1]	20	58	..	24.05 (9.47 in.)	8 (3.15 in.)	2.5 (8 ft. 2.4 in.)	168	30	2.447	5.533	336,000,000
Modulus of elasticity of steel: E = 2,000,000.												

*In reference to the lower and upper planes of the cross tie.
[1] Limit of resistance to rupture, 4,500 kilos.
[2] Moment of inertia right at the openings in the metallic skeleton.
[3] Right at the openings.
[4] Right at the furrings (blocks).
[5] At the extremities and in the central part.
[6] These figures have reference to the neutral axis of the cross tie forming a whole with the furring (blocks).
[7] The beam being supposed of steel.

The composite cross tie is from 1½ to 3 times as rigid as the wood cross tie, even at the notches prepared for the seating of the tie plates, varying according to whether the part notched, which is the weakest section, or the armored metallic part is considered.

This laying was done on February 3, 1902, at a period little favorable for making track. The earth was covered with snow, and it was necessary to break up the subsoil in order to proceed with the laying of the experimental cross ties. In spite of these unfavorable conditions, it was only on the 13th of March following that the first repair was made, consisting of a general tamping necessitated by the thawing, and at the same time of a raising of all the track. Since then it has not been retouched.

When the cross ties were brought to their place, the plate was placed above the blocks, and the two fastenings of the central wedge were tightened alternately to avoid any dislodgement of that piece.

The ballast in track 5 was rough gravel; one of the cross ties, provided with two sections of rail, was placed apart from the tracks in broken stone in order to see in what fashion the pieces of wood would behave in that ballast. The metallic skeleton was left visible in the interior of the track, except for 12 cross ties, which were covered by ballast.

From the time of their placing, the cross ties were subjected to the successive effects of heavy rains, which have lasted during the greater part of the spring, and of excessive heat, which has ruled during the summer.

We examined at different visits the condition of the track, and found each time that the condition was excellent; that notably the fastenings were always thoroughly tight, and that the passage of the heaviest engines (93 tons; including the tender and the load of water and coal, 102.5 net tons) did not cause any apparent deflection of the metallic part binding the two lines of rails.

About 40 engines per day passed over the track, which represents a total passage of 1,200 per month, and of 7,200 during the six months of experiments, reaching to the 3d of August.

Before proceeding with the experiments on the resistance of fastenings, we took the track to pieces and removed some cross ties. We found that the tamped bed under the ties was absolutely intact; that the wood offered no trace of crushing, and that the tightening of the wedges was absolute; that the central wedge had not been raised by the tightening of the screw spikes, and that the allowance existing after placing was maintained without variation, as is shown in the table below:

Number of cross-ties.	Interval included between the bottom of the plate and the upper face of the wedge — To right of axis — Millimeters.	Inch.	To left of axis — Millimeters.	Inch.
26	3	1/8	6	1/4
27	15	19/32	12	15/32
28	10	13/32	10	13/32
29	6	1/4	5	5/16
30	3	1/8	10	13/32
31	10	13/32	10	13/32
32	20	25/32	20	25/32
33	12	15/32	10	13/32
34	15	19/32	5	5/16
35	8	5/16	14	9/16
36	5	3/16	8	5/16
37	15	19/32	7	9/32
38	12	15/32	14	9/16
39	12	15/32	12	15/32
40	17	21/32	16	5/8
41	16	5/8	22	7/8
42	15	19/32	13	1/2
43	12	15/32	17	21/32
44	21	27/32	18	23/32
45	16	5/8	19	3/4
46	20	25/32	18	23/32
47	16	5/8	17	21/32
48	14	9/16	18	23/32
49	9	11/32	17	21/32

EXPERIMENTS ON TRACK NO. 2 OF THE LINE FROM MOUCHARD TO BOURG, BELOW SAINT-ETIENNE-DU-BOIS.

The composite cross ties which were placed at the Bourg station were replaced in the month of January, 1903, (from the 5th to the 8th) in compliance with the ministerial decision of December 12, 1902, in track 2 of the line from Mouchard to Bourg* between kilometers 494,417 and 494,465 in proximity to the station of Saint-Etienne-du-Bois, above an embankment of argillaceous nature, about 1 m 50 (4.92 ft.) in height. This part of the line is located at the origin of a curve of 600 meters (1,968½ ft.) radius, following a tangent alinement of 6,604 meters (21,666.6 ft.) long, at the extremity of a series of grades (4 m/m 6, 9 m/m 5, 2 m/m 8) (0.47, 0.94, 0.28 ft. per 100), which follows a level. It resulted from this situation that the cross ties were at a point where water accumulates and causes the ballast and the embankment on which it rests to soften. The ballast came from the Ambronay quarries (near Ambérieu). It was composed, like the greater part of quarry gravel, of silico-calcareous gravel and of loam in quite a large quantity. The characteristic of this ballast is to form a conglomerate very hard in dry weather, and in wet weather to make a sort of mud more or less fluid, according to the moisture with which it is impregnated.

The cross ties were placed at the rate of 12 cross ties per rail length of 8 meters (26.25 ft.) of the P. M. type, weighing 39 kilogs. per running meter (78.6 lbs. per yd.), over 4 lengths of rail. This type of rail was chosen because the width of its base was adapted to a plate whose dimensions were precisely those of the notch.

*This line is used by fast trains, such as the Berlin-Nice and the Indian Mail; the mean density of traffic of this line is about 20 trains a day on each of the tracks.

The rails thus employed had been taken from the track after a long service†, which explains their exceptional deformation, and made conspicuous by the unevenness of 3 millimeters (⅛ in.) which they present in a short length (about 1 meter) (39⅜ in.). They rested on the cross ties, as we shall see further along, by means of P. M. plates; the fastenings placed unsymmetrically, and composed of screw spikes No. 6, were to the number of 8 per cross tie, 2 outside and 2 inside each of the rails. There was placed at the beginning, and at the extremity of the track thus laid on composite cross ties, a length of rail of the P. M. type on wood cross ties with the same laying, in order to be able to establish a comparison.

All of these cross ties were inclined toward the center of the curve of 600 meters (1,968½ ft.) radius turning to the right, with a superelevation of 0 m .083 (3⁹/₃₂ in.). This inclination had further the disadvantage of throwing all the surface water of the track in the inter-track space, where it was held by the impermeability of the ballast.

Left under these conditions for more than a year, the cross ties have been submitted to the successive effects of heavy rains, which lasted during a large part of the time, and of the period of warm weather.

The condition of the track was examined at different visits, and it was proved each time that the condition was excellent; that there was never occasion for retightening the fastenings, and that the cross ties under the passage of trains (about 8,000) did not undergo any apparent bending. Thus there was placed on the composite cross ties, the same as on the neighboring wood cross ties, a bed of gravel over the whole surface; it was proved that not a grain of gravel was detached by the passage of express train 682 from the edges of the composite cross ties, whilst there existed cracks in the surface of over a third of the wood cross ties. This difference in the stability of the gravel evidently arises from the pronounced bending of the wooden ties.

As a result of the super-elevation and grade, argillaceous nature of the ballast and of the subsoil, the composite cross ties, principally those of the even-joint, rested on a muddy bed, and the water visibly churned at the passage of each train. This bed was then essentially elastic, and this elasticity varied with the quantity of water. The cross tie was not unwedged, as one would suppose, for it always rested on its blocks, which were buried more or less considering this condition. The wood cross ties were found in nearly the same situation, with this difference, however, that their bed was more solid by reason of the ballast being less argillaceous.

On the other hand, the defective profile of the rails employed, which has been pointed out above, produced disagreeable unevenness in the stability of the cross ties which underwent the shocks. The joints were particularly bad in consequence of the flattening of the ends of the rails, to such an extent that it was necessary to sustain them by wedges placed between the splices and the under part of the rail head; these defects were but little corrected. The experiment was therefore made under the most unfavorable conditions, but, nevertheless, the results obtained have been excellent. The fastenings have held without our having been obliged to retouch them. The tamping was maintained on a horizontal bed over the whole length of the blocks, whilst it has a tendency to form under the wood cross ties either a concave basin, on the edges of which they rest in a state of repose, or a convex cap, on the summit of which they find support. The rewedged joints no longer presented a sensible unevenness at the passage of vehicles; the rolling was then very much improved.

EXPERIMENTS ON THE BOURG TRACK, SPECIALLY LAID FOR THE TESTS.

Mr. Ferry, Sub-Engineer of the company, had caused a track to be extended in a cul-de-sac of the Bourg station, along the loading quay for animals, in order to permit experiments on the length of cross ties and of their tamped bed, and to join them with the tests executed up to that day, by means of loads perfectly defined, acting always under the same conditions.

The subsoil, specially cleared away for the laying of the track, consisted of an argillaceous conglomerate, enclosing small pebbles of gravel; it was not therefore perfectly homogeneous. The ballast was fine gravel. There were successively placed in the track thus established composite cross ties, wood cross ties and cross ties wholly metallic.

EXPERIMENTS ON TRACK NO. 2 OF THE LINE FROM MOUCHARD TO BOURG, ABOVE SAINT-ETIENNE-DU-BOIS.

In order to be able to better appreciate the difference of stability of composite and wood cross ties, and to eliminate all influences on this stability, independently of their own resistance, such as inclination on the curves, the elasticity of the road bed, the argillaceous nature of the ballast, we deemed it a duty to remove the cross ties which were laid, as we have pointed out, below the station of Saint-Etienne-du-Bois, and to put them above at the entrance

†These rails had endured a density of traffic of 150,000 trains; we had not been able to find new rails of the same length in the stock of the company.

of that same station, on tangent, on a very solid road bed, and finally to ballast them with gravel purged as much as possible from clay. I had, in advance, the ends of the cross ties cut off, in order to leave them exactly of the length of 2 m 20 (7 ft. 2.64 in.), corresponding to the minimum bending, and to the distance between the extremities of the blocks. The metallic skeleton projected, in fact, beyond the wood by 0 m 15 (5.91 in.) at each end, and this excess of length was quite useless.

The wood cross ties were laid at each of the extremities of the section thus selected to serve for terms of comparison. They were of the ordinary dimensions and length. All these cross ties were provided with P. M. rails, absolutely new, whose rolling surface was consequently as good as possible. The ends of the rails laid on composite cross ties were joined by ordinary splices; on the wood cross ties, angle bars were used.

When the track had taken its bed, the curves of flexure of the cross ties were determined anew; then account was taken of their tamping and of their depression in the track after the passage of the same number of trains. Finally the study of the joint, so interesting and so difficult, was commenced.

These experiments, which have already been pursued for a year, have not yet sufficiently advanced for me to have made known the results. I can, however, already affirm that everything has happened as I had foreseen, and that the composite cross ties of 2 m 20 (7 ft. 2.64 in.) have a stability in the track much superior to that of the ordinary cross ties, other things being equal. That is due to their greater rigidity and to the tamped bed which is maintained in the condition in which it was placed.

It will be interesting, after a longer period in the track, to make known and explain the facts which will be found.

Economy in Track Work.*

Do not carry a large amount of surplus or emergency material on each section, but keep a full supply at a few important points from which shipment can be made quickly.

The general impression is that all scrap is sorted at the shops and that none of the usable material is lost sight of. While this is probably true, the proper place to do the sorting is on the section, where the material can be used. Material not suitable for main track can be used to advantage in unimportant sidings.

If you have a gang of 12 or 15 green laborers on a section, give the foreman an assistant and do not expect him to raise track, put in ties and do other work to advantage without, for there are some things that even a section foreman cannot do. If the gang is increased to 70 men, give him a timekeeper and all the assistant foremen your superintendent will stand for. A common mistake is to have too little intelligent supervision. This is what we must have, and it is money well and economically spent. If you have a work train doing any kind of work, assemble all the men you can work to advantage. If you have 30 carloads of ties to distribute on your division, instead of working two days with a small gang of men, get together men enough to finish in one day. You thus save the expense of the engine and crew for one day and incidentally give the train despatcher one day's use of the engine and free the 15 cars one day earlier. In these strenuous times this is a big item.

On the other hand, if you have a few rails to load at some point, send just enough men to handle the rails, but no more. A track-laying gang to work economically should be just large enough for the work to move along smoothly all the time, each man doing the same work all the time. The exact size of the gang will depend to some extent upon the kind of men.

In gaging track in the fall and winter it is not necessary to spend time in plugging spike holes in ties that will be taken out of track the following spring. If you are working six or eight men, do not keep them all on the handcar in your daily trip of inspection over the section; you can surely leave part of them where the day's work is to be done and outline enough work to keep them employed until you return. If, when you have the entire crew on the handcar, you discover a broken fence board or wire, broken bolt in frog or switch, or any of the numerous small things you find every day, do not go at the work with the whole crew, but leave one or two men to make the repairs and go on to your regular work with the balance of the men. Some men will accomplish little enough if they are placed where work is staring them in the face, and the foreman is pounding them on the back. We should certainly avoid placing them in positions where they cannot find work if they are looking for it. I venture to say that we have all seen four and even six men trying to put a pair of angle bars on a joint or replace a broken bolt, in most of these cases the foreman doing the greater part of the work. In rare cases we see a tendency on the part of the foreman to exercise too much supervision. It is poor economy for a foreman to stand around in the winter and direct the work of one or two old, experienced men in cleaning out switches and crossings, gaging and shimming track, or other work. This is one of the cases where the roadmaster puts in his oar and pulls for economy.

*From a paper by C. H. Bowen in the *North-Western Bulletin.*

Preparation for Electrification of the New York Central Terminal.

The studies made; the years of preparation; the employment of critical independent engineers as members of a commission; their continued study of facts and discussion until in each doubtful item unanimous judgment was secured; a series of experiments on the six-mile experimental track at Schenectady at all speeds up to 75 miles per hour; and finally the precautions suggested to the operating department—this work, begun in August, 1901, and made practicable for train movement at the close of 1906 is a monument of engineering skill and precaution. It is in these hasty days, a credit to the company and to Mr. Wilgus, the Vice-President, who has had charge of it.

Six months before the regular train movement began, detailed information was given of the new conditions to be met, and all these have since been thoroughly dealt with by the operating officers in the preparation of instructions and in the training and examination of the trainmen and those engaged in the maintenance and operation of the signals, power stations and track. The following suggestions, made by Mr. Wilgus on June 7, 1906, are worth recording as an instance of foresight and precaution:

(1) *Instructions for Motormen.*—In order that those engaged in handling the electrical apparatus may thoroughly understand it, the Electrical Engineer has prepared an instruction book for motormen. * * * It is extremely important that this book shall be in the hands of the men intended for electrical service not later than July 1. * * *

(2) *Operating Department Instructions.*—I am not certain that any alteration is required in the Operating Department instructions for Electric Zone service, but I suggest that this matter be considered so that if any changes or supplemental instructions should be issued to conductors, trainmen, enginemen, etc., operating wholly or partly in the Electric Zone, they may be issued in time to be thoroughly understood before the change of motive power.

(3) *Signal Instructions.*—The electric automatic signals now being installed in the Initial Zone make necessary the preparation of a book of instructions governing Operating Department employees, and it seems wise to prepare a book of this character that will be separate from the operating book above referred to. It would seem unwise to prepare a special book for the Electric Zone only, and I therefore suggest the wisdom of preparing at this time a new up-to-date book of instructions for signals covering the entire system, of course, specialized where necessary to cover the Electric Zone. * * *

(4) *Maintenance of Way Instruction.*—It would seem to me wise to prepare a new issue of the book governing the Maintenance of Way Department that will be expanded to provide for the proper maintenance not only for regular steam railroad practice, but also of special work in the Electric Zone, such as power stations, substations, transmission lines, working conductors, signals and possibly equipment. * * *

(5) *Power Station, Transmission Line, Sub-stations and Working Conductors.*—In order to assure the company a working electrical installation in first-class condition I have arranged for the organization of an operating force, and the men are being employed and placed as fast as the construction work permits. By this arrangement the men will be educated to their respective duties and a competent organization will be in readiness to turn over to the Operating Department when I feel assured that all parts are working smoothly and ready for final acceptance. The employment of these men is being conducted with great care and in each case the advice of Mr. McCormack is secured so that the force when turned over to him will be satisfactory. It is my understanding that I will continue to exercise jurisdiction over these operating forces until matters are running smoothly, which I believe will be shortly after the change is effected from steam to electricity.

(6) *Equipment.*—Locomotives and cars will soon be delivered to the Electric Zone and I will arrange for the necessary watchmen and also for the operators on the locomotive and motor car testing tracks between Morris Heights and Marble Hill. It therefore would appear proper for the Operating Department to now arrange a programme whereby men may be in readiness for the operation and maintenance of this electrical equipment when it goes into service in the early fall, including shopmen, inspectors, repairmen, etc., * * * so that these forces may be trained in advance of the change of motive power. * * *

(7) *Motormen, Conductors and Trainmen.*—We now have between Schenectady and Hoffmans an experimental track on which locomotives are being tested as they leave the shops. We are also installing so as to have in readiness for service about July 20, two test tracks between Morris Heights and Marble Hill, on which an electric locomotive and motor car will be in service for the educa-

tion of the men to be used as motormen, conductors and trainmen in the electric zone. I suggest that a definite programme be adopted as soon as possible whereby classes can be established under proper tutorage at Schenectady and later at Morris Heights, for the education of men that will be called upon to operate trains in the electric zone. It would seem wise to have trainmen and conductors go through practically the same course as the motormen, so that they may be available for the running of trains when necessary and also so that they may be capable of promotion.

(8) *Signals and Interlocking.*—The interlocking plants and automatic signals in the electric zone will in many respects be radical departures from existing practice, and therefore those who are to operate and maintain these features should be thoroughly trained in their use before next fall. I suggest that the representative designated by you confer with Mr. Ames to arrange a programme whereby a proper course of instructions may be adopted for these men well in advance of the time when they may be called upon to operate and maintain the apparatus.

Railroad Liability for Damage by Fire.

BY JOHN EDSON BRADY.

It is a principle, firmly fixed in the law, that he, who by his negligence or misadventure creates or suffers a fire upon his premises, which spreads or is communicated to the property of another, is liable to the latter in legal damages to the extent of the injury occasioned. The rule, however, is subject to certain qualifications and limitations which have grown into the law, and is one which must be applied to the facts of each individual case as the case arises.

In some states statutes have been enacted under which a railroad company is made absolutely liable for the value of property along its right of way damaged or destroyed by fire communicated in the course of the operation of the road. It is usually provided by these statutes that the railroad may insure for its own benefit the property along its route and so protect itself against the liability imposed by the statutes. Under such statutes, where it is sought to hold a railroad company liable for a loss by fire, the question becomes one merely of proving the loss and the origin of the fire. But in jurisdictions where there are no legislative enactments of this character the courts are often called upon to solve intricate problems and draw fine distinctions in determining the existence and the extent of the liability of a railroad company for damage to the property of others by fire originating on the premises of the company. In the absence of statutory provision, in order to hold a railroad company responsible for such a loss, it must be established, not only that the fire complained of was brought about by the act of the company, but also that the company was guilty of negligence therein. In fact, it has been said that negligence or wrongdoing is the very gist of the action. Thus, where a building standing near a railroad right-of-way is set on fire by sparks from the smoke stack of a locomotive and the company is shown to have acted without negligence, and to have exercised due skill and care, the owner is not entitled to recover from the company for his loss. What is or is not negligence is, of course, a question which must be determined upon the particular facts and circumstances of each case. While to establish negligence on the part of a railroad company is an essential step in making out a case for damages, it is not necessary to show that the company was grossly negligent; Railroad Company vs. Noel, 77 Ind. 110. The plaintiff is required to show only that the company was guilty of a lack of ordinary and reasonable care in order to establish this important element of the right to recover and the company may escape liability if it can show the presence of ordinary and reasonable care. Hagan vs. Railroad Company, 49 N. W. Rep. 509.

To render a railroad liable for loss by fire resulting from the negligence of the company it must be shown that the loss was the natural and proximate consequence of the negligence of the company. Liability does not extend to consequences which are remote, incidental or exceptional. And "proximate," as here used means closeness of casual connection, and not nearness in time or distance, and it is intended to qualify the generality of the idea expressed by the word "natural." In the case of Kuhn vs. Neeb, 32 N. J. Eq. 647, an action brought against the receiver of the Erie Railroad, a fire originated in a disaster, which occurred at Paterson, N. J., through the negligence of the company's agents, in which 25 cars loaded with petroleum collided with a locomotive attached to a freight train. The force of the collision threw some of the oil tanks from the cars, causing them to burst and to discharge their contents. The oil, thus released, spread over the roadbed and was set on fire by the coals shaken from the locomotive. The burning oil ran down an embankment into a small brook, over which the road was constructed at that point, and was carried by its water to the Passaic river, and thence to the plaintiff's building, which stood on the bank of the river, firing the building and destroying it. The general rule was stated to be that, where a fire originates in the negligence of a defendant, and is carried directly by a material force, whether it be the wind, the law of gravitation, combustible matter existing in a state of nature, or other means, to the plaintiff's property and destroys it, and it appears that no object intervened between the point where the fire started and the injury, which would have prevented the injury, if due care had been taken, then the defendant is legally answerable for the amount of the loss. Under this rule the defendant company was held liable in damages for the destruction of the plaintiff's building. The question of proximate consequence was involved in the case of Metallic Compression Casting Co. vs. Railroad Company, 109 Mass. 277, it appeared that an engineer knowingly ran his locomotive over a fire hose and cut off the supply of water from a burning building which the firemen were attempting to save. There was no urgent reason why the train could not have waited for the hose to be uncoupled and the building would, in all probability, have been saved had the hose not been severed. In deciding in favor of the owner of the building the court said: "What kind of damage can be a more proximate consequence of the want of water than the destruction of a house by fire which a proper supply of water would have saved?"

Another rule of liability is that a defendant railroad company is responsible for such losses only as might have reasonably been anticipated as a result of the negligent or wrongful act. However, it is not necessary that the precise result should have been foreseen or anticipated; it is sufficient if events follow in ordinary sequence. The working of the rule is illustrated in the case of Miller vs. Railroad Company, 90 Mo. 389. It there appeared that fire was negligently permitted to escape from one of the defendant's locomotives and was communicated from dry material on the railroad right-of-way to the plaintiff's fence which was consumed. The destruction of the fence created an opening through which cattle gained entrance to the plaintiff's field and damaged his crops. The damage to the crops was regarded as one which might have reasonably been anticipated by the railroad and the company was held responsible for that damage as well as for the value of the fence which was destroyed.

It seems that, in order to hold the railroad company responsible, it is not necessary that the fire complained of be directly communicated to the property destroyed and time and distance appear to play no material part in determining the question of liability. In the case of Poeppers vs. Railroad Company, 2 S. W. Rep. 439, sparks escaping from a railroad locomotive set fire to the grass on the prairie adjoining the railroad's right-of-way at a point where the grass was very dry. During the day a high wind carried the fire some three miles and it continued to burn slowly through the night after the wind had fallen. The following morning a violent wind, though not an unusual one for the part of Missouri where the fire occurred, swept the fire five miles further to the plaintiff's farm, where it crossed a fire line of 16 ft. of plowed ground and destroyed the plaintiff's property. It was held that the fire was a continuous conflagration, notwithstanding the lapse of time and the great distance over which it traveled, and that the company was liable for the damage suffered by the plaintiff.

Proposed Kansas City Union Station.

The announcement that the proposed union passenger station at Kansas City would be built on the Kansas City Belt Railway near Twenty-second street and Grand avenue was made February 18, 1906. Since then the Kansas City Terminal Railway Company has been organized for the purpose of taking over the property of the Kansas City Belt Railway and building and maintaining the union station and tracks leading to it. The capital of this company is at present $30,000,000, but this is to be increased to $50,000,000 in the near future. Ten railroad companies are represented in the Terminal Company, and it is reported that three additional companies, the Kansas City Southern, the Kansas City, Mexico & Orient, and the Chicago Great Western, desire to gain entrance to the proposed station.

Mr. Jarvis Hunt, of Chicago, has been engaged as architect, and is said to have prepared several sets of plans for the passenger station, but these have not yet been made public. The delay in proceeding with the work has been largely due to the difficulties encountered in reaching an agreement with the city in regard to provisions to be incorporated in necessary ordinance. An agreement has just been reached by representatives of the Terminal Company and a committee of the City Council. The main points of this agreement are that the Terminal Company is to complete a $2,000,000 union passenger building within three years, build or re-build and maintain viaducts or subways at 49 street crossings and provide five union freight depots; and that in exchange the city is to grant a franchise for right-of-way for additional tracks along the line of the Kansas City Belt Railway along the south side of town for a term of 999 years, the life of the present Belt Line franchise, and grant a franchise for four freight tracks along the Chicago & Alton

on the north side of town for a term of 50 years. Charter amendments will be necessary to authorize the City Council to grant these franchises, as the present city charter limits the life of such franchises to 30 years. In general, such streets as are to be closed across the Terminal Company's tracks will be vacated by the city, but such streets as are to be carried across on viaducts or by means of subways will not be vacated.

The points on which it was most difficult to reach an agreement were the term of franchise for freight tracks on the north side of town and the vacation of streets. The representatives of the railroads contended for a 999-year franchise for the freight tracks and for the relinquishment by the city of all control over such portions of streets as are to be replaced by viaducts or subways, but a compromise was finally reached as outlined above.

Mr. John M. Egan, President of the Kansas City Terminal Railway Company, has recently resigned to connect himself with some railroad interests of Sir William Van Horne in South America. It is expected that his successor will be elected this week.

Upward-Inclination Three-Position Signals, on the P., B. & W.

The installation of automatic block signals, arranged largely according to the new ideas proposed at the last annual meeting of the Railway Signal Association, which was recently put in service on the Central Division of the Philadelphia, Baltimore & Washington, was described in the *Railroad Gazette* of October 19 last, page 341, but without illustrations. The press bureau of the Pennsylvania Railroad System—which includes the P., B. & W.—has now sent out photographs and drawings, with some additional descriptive matter, and these we give herewith.

The installation is on the Central division, running southwest

Fig. 1—"Stop and Stay" Signals. Clear Indication for Moderate Speed Into Side Track.

from Philadelphia. Forty-ninth street (see diagram) is a reporting station, being at the terminal of the Central and Philadelphia Terminal divisions, and train orders are frequently necessary. Signals Nos. 32C and 33C are ordinarily operated as automatic signals, but may be placed in stop position by the operator when necessary. The lights are therefore vertical instead of staggered and the signals are "Stop and Stay," instead of "Stop and Proceed."

Fernwood is a junction point with a branch line. It was thought that the business hardly warranted the employment of operators and installation of an interlocking immediately, but an advance signal eastbound was required for trains leaving the branch, and was located in its proper position for use if an interlocking were installed later. It was also desired to demonstrate the ease of control of a distant signal by two home signals. Signal No. 62 at Lansdowne can only be cleared when signal No. 56 is cleared and No. 54 is at caution or clear. The "wireless" circuit is used.

Under ordinary circumstances the pole changer on a given signal reverses as soon as the signal moving from stop reaches the caution position, thus clearing the signal in the rear which has assumed the caution position on the passage of the train from its block. A pole changer of this kind is placed on advance signal No. 54, but as signal No. 62 at Lansdowne must be cleared only when advance No. 54 is at proceed and consequently when home signal No. 56 is clear, the pole changer on this home signal does not shift until the arm attains the clear position, and there is no

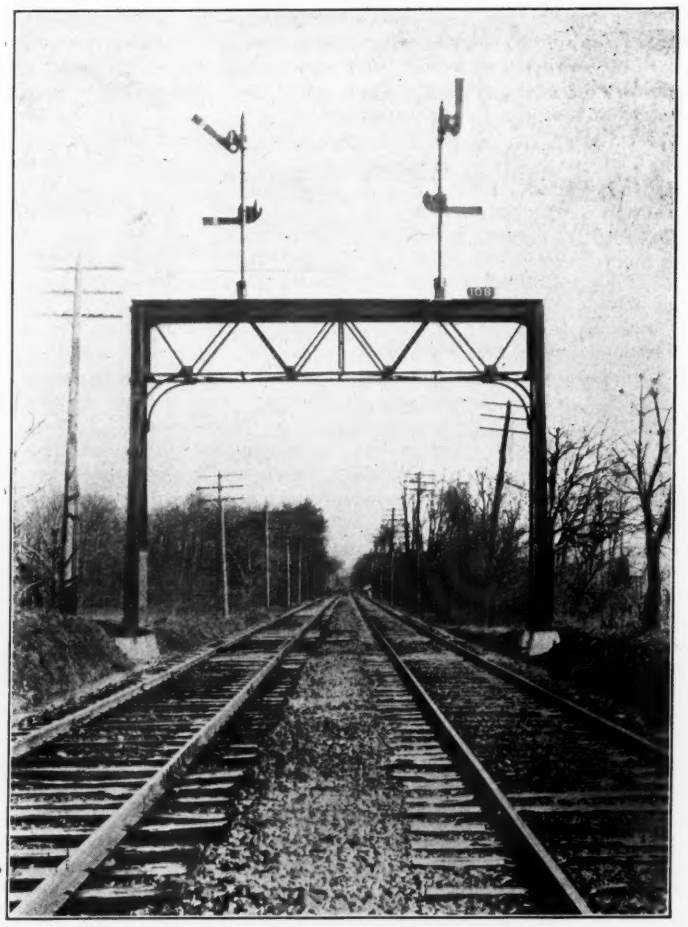


Fig. 2—Bridge Between Morton and Swarthmore "Stop, Wait Time and Proceed" Signals.

necessity for wires such as are commonly used for distant control by two home signals.

Between Clifton and Swarthmore the right-of-way was so limited that the telegraph line interfered seriously with the view of the signals and two-track signal bridges were used. The hand rails were not entirely completed when photographs were taken. Fig. 2 shows the bridge between Morton and Swarthmore. The battery and relay shelters are built as inconspicuously as possible in the bridge leg, which is especially designed to hold them.

The treatment of signal No. 156 is one of the debatable points. This being the commencement of the block system and track circuit controlled, three courses were open. The lower arm is the distant for the signal at "D K," and is consequently two-position. If treated as an automatic block signal, the top arm with tracks occupied would also show stop, and a stop signal would be displayed with no warning distant signal in the rear, which would violate the principle of advance information for every stop signal.

If treated as is the custom at the beginning of an automatic installation on the Pennsylvania Railroad, namely, as a distant signal, simply, and not indicating the condition of the track, it obviously should not have the lower arm at stop and the top arm at caution, normally, as this is the aspect of the other signals when next signal is at stop and track clear. Hence, the top arm was fixed at caution and the lower arm moves only from caution to clear. This can only be cleared when track is unoccupied, so that this latter aspect does not conflict with the other signals, and in the normal indication (two arms, at 45 deg.) it is a different aspect from any other displayed.

It is still an open question whether or not this should be made a "Stop and Proceed" signal, the arguments in favor being that then the caution position would always mean track clear and next signal at stop on every signal, and the stop indication would never be displayed unless track were occupied when a stop is required.

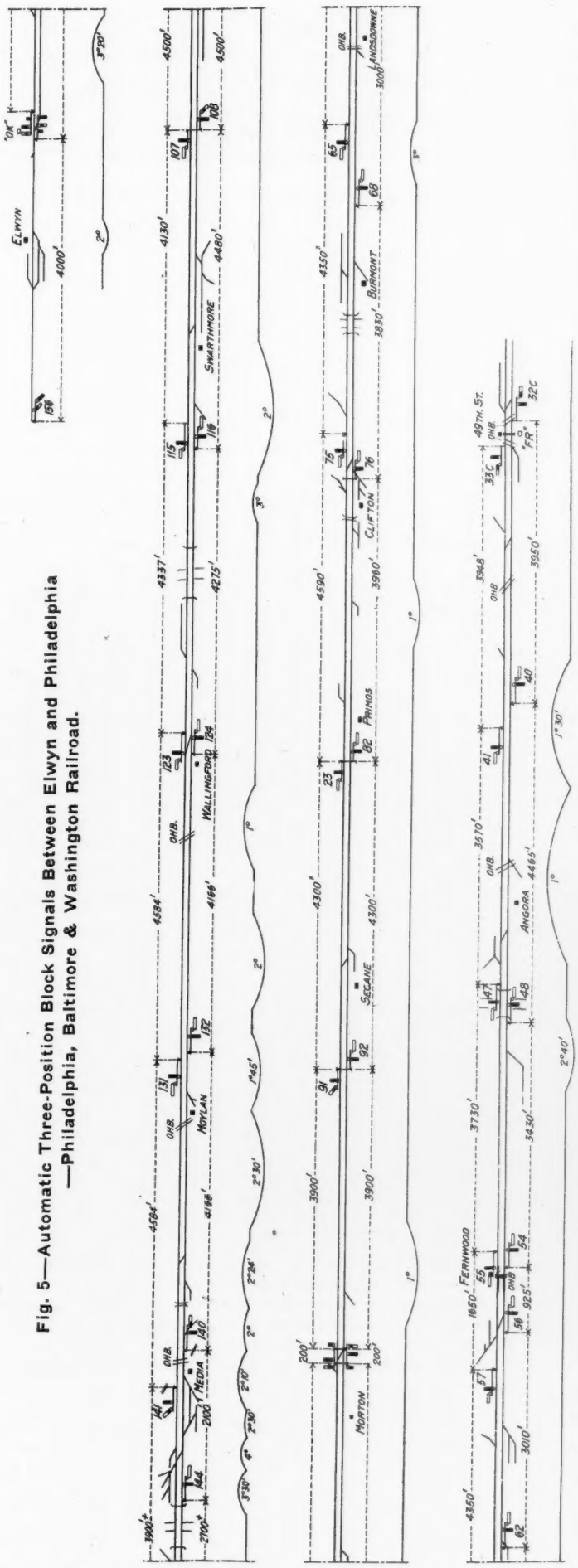


Fig. 5—Automatic Three-Position Block Signals Between Elwyn and Philadelphia —Philadelphia, Baltimore & Washington Railroad.

The argument against is the lack of distant signal, in turn, for it. This point and one other are practically all that are to be decided to complete and perfect the system.

The second point has developed in working out the details of the signaling at the new Washington terminal, where this system is to be installed jointly by the Baltimore & Ohio and the Pennsylvania.

With all interlocking signals semi-automatic, as on the Central division, it is impossible to attach cars or switch engines to trains, or to close trains in, except under hand signals. The same difficulty exists on all roads in automatic limits, when the interlocking home signals are semi-automatic. It is now proposed to make the low speed arm semi-automatic, from caution to clear only, and to so arrange the locking and circuits that it may be displayed at caution for any route, including the high-speed routes, if the latter are blocked by cars within the interlocking limits.

In other words, if a high-speed route is clear and next signal clear, the top arm will clear. If the track is clear and the next signal at stop, it will assume the caution position. If the track is occupied the top arm will indicate stop, but the low-speed arm may be shown at caution, thus combining the safety of the semi-automatic feature for high-speed movements, and the elasticity now attained where at outlying interlockings, the signals are not semi-automatic, and hand signals are the exception rather than the rule.

The decimal system of numbering is used. Each signal is numbered in tenths of miles from Broad Street Station, Philadelphia, odd numbers for westbound signals, corresponding with the odd

Fig. 3—Same Functions as Fig. 2.

numbered trains, and even numbers for eastbound, the nearest tenth being taken. By this system, signals can be added without inserting half numbers, etc., and the location is quickly determined by despatchers. The affix "C" on the signals at Forty-ninth street indicates "Central division," as they are located on the terminal division.

The signal cylinders are tandem and the arms are pulled "Clear" by a $^{3}/_{16}$-in. rod instead of being pushed "Clear" by a ¾-in. pipe or a 1-in. rod. This new construction saves considerable power. The relays are 5-ohm universal, neutral polar and the pole changers are pneumatic. It has developed that an ordinary mechanical pole charger would probably be as well suited to the work.

All switches are equipped with rotary circuit controllers which shunt the track circuit through two No. 6 B. & S. wires when switches are open. All boot-leg wires are No. 6 B. & S. plugged

through web of rail with channel pins and running direct to battery, relay or pole changer without splices.

All sidings are equipped with pipe connected derails, a number of the Hayes type, operated from the main track switch lever. Both ends of the main line cross-overs are operated through switch and lock movements from one ground lever placed in the middle of the cross-over tracks, making it impossible for careless trainmen to close the switches and clear the signals with an engine standing on the cross-over, and avoiding the use of special circuits to protect this danger point.

At first, trainmen unfamiliar with the device used too much force on this lever, and connections were sprung, or switch timbers moved. This trouble has practically ended, but it is thought that in future installations it will be preferable to use this lever to lock the points only for main track, operating them from ordinary switch stands, and thus making flying switches possible while insuring that switches must both be locked before the signals will clear, the circuit closer being operated by the lock itself instead of by the switch.

All interlocking home signals are power operated, semi-automatic controlled through stick indicators so arranged that they go to stop on the passage of train, and cannot be operated again until the train has left the circuit, and the operator restored his lever normal and again reversed it. Approach indicators and approach locking are provided, taking effect one block in the rear of the distant, and so arranged that if the home lever latch has been raised it cannot be put down to release the machine locking until a period of two minutes has elapsed. The circuits are so arranged that if a portion of the train is left on the approach circuit, the locking automatically releases when engine enters the home signal circuit, so that no hand or time release is required for ordinary trailing drill movements; but if a second train enters the section, the approach locking will become effective as soon as the home signal is cleared for it to proceed. The circuits are simple and ingenious and have been employed at many points in the system with great success.

The slow hand release, so called, is really a time release, operated pneumatically and so arranged that it is out of control of the operator. This is another ingenious device and its first application was made at Morton.

Special lamps and brackets were provided, as it is known that with those in ordinary use the lost motion between the lamp socket and bracket are sufficient to allow the lens in many cases to angle so much to the side as to prevent its focusing properly along the track.

The principles which govern this arrangement of signals are set forth as follows:

1. Two arms and two lights will be displayed on every high signal. With ordinary signal arrangements if any arm were broken or a light extinguished an engineeer would probably not notice it, as he could not be expected to remember how many there were on each particular post, while if there were always two he would notice the slightest derangement of either of them.

2. Day indications are given by three positions of the arm in the upper right hand quadrant, and at night each position is indicated by a different colored light.

3. Class A Signals. "Stop and Stay" signals. At these if a train is stopped it must stay until the signal is changed allowing it to proceed. This class includes interlocking, train order, controlled manual and telegraph block signals. The lights are vertically over one another and the arms appear the same length.

Class B Signals. "Stop, Wait Time and Proceed" signals which authorize or restrict train movements and past which a train, if it is stopped, may proceed after waiting time, even though the signal has not changed and still indicates stop.

This class includes automatic signals (and incidentally distant signals when the latter are used as independent indications). The lower arm and light are not directly under the upper arm and light, but located toward the left, so that the lower arm appears about 2 ft. shorter than the upper one and the lower light shows on the left-hand side of the post, while the upper one shows on the right-hand side. This staggered relation of the two signals is very noticeable both in daytime and at night.

Class C. Signals which give information only and do not authorize or restrict train movements: Switch indicators, both home and distant; flag station, water tank and stop and slow signals, indicated by horizontal lights and special designs for day indicators. These signals are all low and do not interfere with the two-signal principle used on the high poles.

4. Signals designate the speed of the trains rather than the routes, at points where interlocking systems are used.

The top arm governs the high-speed track, provided no cross-over movement is included in the route. It indicates proceed at highest speed permissible, modified, of course, by curves or any arbitrary order placed upon the speed.

The second arm governs medium speed movements, and refers to a divergence from the high-speed routes, such as an easy cross-over upon which a speed of 40 or 50 miles an hour is proper.

The third arm governs low-speed movements; over short cross-overs or against traffic, or into sidings, etc. This arm is shorter than the other two, has a short range light and is placed much lower down the post than the two main signals.

On signal posts where no high-speed route exists, the top arm is fixed in the horizontal position and the light is always red. At signal posts where no cross-overs or moderate-speed routes exist the second arm is fixed in the horizontal position and the light is always red. The only case where the top and second signals would both be out of horizontal position at the same time is on an automatic signal post where the lower arm would act as a distant signal for a medium speed route controlled by an interlocking tower ahead.

The system has been in service about two months and its operation has been highly satisfactory. During the rush hours in the morning there are 10 trains east in two hours and eight minutes, or a train every 13 minutes, while two freights are working their way west with work to do on the eastbound track at various stations. In the evening, when the heavy travel is westbound, there are nine trains in less than two hours, or a train every 13 minutes, with generally one freight west and two east with work to do. Under these conditions the operation of signals is very frequent and the requirements for their proper operation to prevent delay and insure safety are very exacting. There are 40 signals in service, equal to 80 home and distant. During December there were three failures in operation—one due to broken wire, one due to weak battery and one cause unknown. The percentage of failures on the home and distant basis is, therefore, .038 per cent.

It is probable that if the system goes into general use on the Pennsylvania the colors of lights will be changed as recommended by the committee. Then indication "clear" will be given by green instead of white, and the indication "caution" will be given by yellow instead of green.

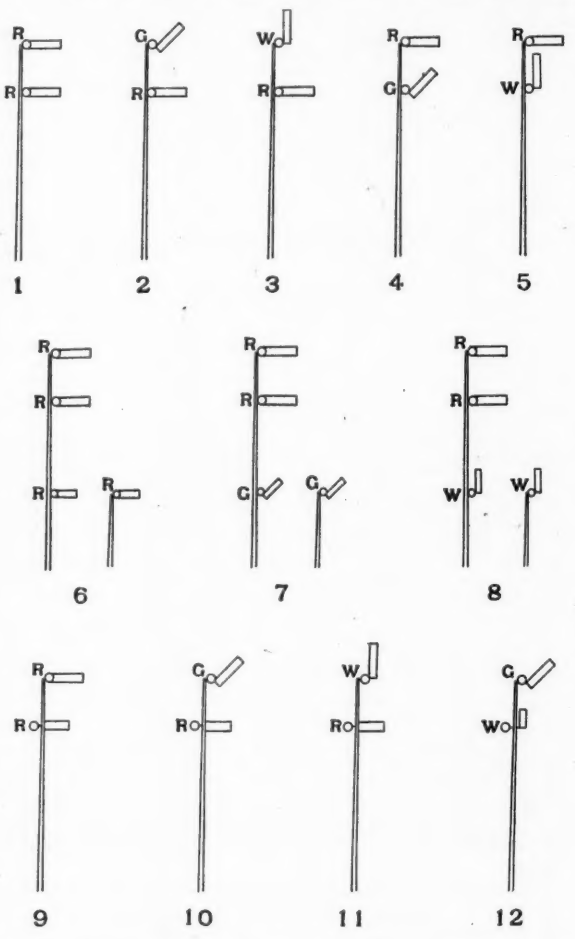


Fig. 4—Classification of Signal Indications—Central Division Philadelphia, Baltimore & Washington.

Numbers 1 to 8, inclusive, are Class "A," "Stop and Stay." The first five show the proceed indications for high and moderate speeds, and the other three show the proceed indications for low speeds, as follows: 1—Stop and stay; 2—Proceed with caution to next signal, on high-speed track; 3—Proceed at high speed, on high-speed track; 4—Proceed with caution to next signal, on moderate-speed track; 5—Proceed at moderate speed, on moderate-speed track; 6—Stop and stay; 7—Proceed with caution, on low-speed track; 8—Proceed at low speed, on low-speed track.

Numbers 9 to 12, inclusive, are Class "B," "Stop, Wait Time and Proceed" signals. These are for the automatic system and also for distant signals when the latter are used to give an independent indication; 9—Indicates stop, and proceed after waiting time; 10—Proceed to next signal, prepared to stop; 11—Proceed at speed, next high speed signal at caution or clear; 12—Proceed at moderate speed, next moderate-speed signal at caution or clear.

In all the figures R indicates a red light; G, green; W, white.

GENERAL NEWS SECTION

NOTES.

An elaborate railroad commission bill has been introduced in the legislature of Pennsylvania.

The Los Angeles Limited over the Chicago & North-Western, Union Pacific and San Pedro, Los Angeles & Salt Lake has been discontinued.

The Norfolk & Western has increased the pay of telegraph operators 11 per cent., and at 88 offices the work day has been reduced to eight hours.

An officer of the Chicago, Milwaukee & St. Paul says that the report of a reduction in freight rates by the State Railroad Commission of South Dakota is unfounded.

The Secretary of Agriculture is said to have 700 lawsuits prepared against western railroads for violation of the cattle transportation law, which he will soon begin to prosecute.

The new Alabama State Railroad Commission organized March 4. The members are Charles Henderson, of Troy (President); John G. Harris, of Montgomery, and W. D. Nesbit, of Birmingham.

The enginemen of the Lake Shore & Michigan Southern announce that after extended negotiation with officers of the road they have been granted an increase of pay ranging from 10 to 18 cents.

The State Railroad Commission of Vermont, in its report on a butting collision which occurred on the Central Vermont near South Royalton, recommended that in all cases of this nature the persons found responsible for the collision should be criminally prosecuted.

The Chicago, Milwaukee & St. Paul bridge across the Missouri at Chamberlain, S. D., has been wrecked by ice. More than 600 ft. of bridge and trestle work were swept away. This makes a break in traffic over the new line from Chamberlain west toward Rapid City, of which 75 miles are built.

The fast freight lines of the Grand Trunk are to be consolidated, and at the beginning of next month the offices of the different lines in each city will be put together. The lines included are the National Despatch, the Commercial Despatch, the Reading Despatch, the Lackawanna-Grand Trunk and the Great Eastern.

E. F. Hoesen, of Buffalo, N. Y., a Civil Engineer of extensive railroad experience, has been engaged by the New York State Railroad Commission to investigate three recent railroad accidents. Accidents have been occurring so frequently that the regular inspectors of the board are unable to keep up with the work.

The Pennsylvania Railroad has made an advance of 19 cents a day, from $2.11 to $2.30, in the wages of the brakemen on the Philadelphia and the Schuylkill divisions. It is said that this advance was made to put the pay of these men on a level with that of similar grades on other parts of the Pennsylvania system.

The Railway Commission of Canada has issued amended rules governing the use of interlocked signals at crossings of railroads, in which there is a requirement that passenger trains must be run over crossings at not over 35 miles an hour, and freight trains not faster than 20 miles an hour. Drawbridges must be crossed by passenger trains at not over 25 miles an hour and by freight trains at not over 15.

According to a press despatch from Houston, March 9, the Sunset Limited express of the Southern Pacific, having arrived at that city 50 minutes late, was annulled for the rest of its journey in order to avoid disobedience of a recent order of the Texas State Railroad Commission requiring passenger trains to run within 30 minutes of their schedule time. Passengers on the train, bound for the Pacific coast, had to wait in Houston 12 hours.

It is announced in Des Moines that the Iowa Railroad State Commission intends at once to order a reduction of about 16 per cent. in the rates for the transportation of cattle. The Commission says that present cattle rates, which have been in effect for seventeen years, were fair when they were established, but should be reduced now. It says that rail transportation costs more for livestock than for almost any other commodity, and that expenses of operating railroads have largely increased, but that in spite of these facts there is too great a difference between livestock rates in Iowa and Illinois (23½ per cent. less in Illinois). Assuming that in justice to the roads Iowa rates should be slightly higher than those of Illinois, the Commission thinks the difference in rates between the two states is still too great.

An officer of the Pennsylvania Railroad says that the company must have more college men. Hitherto about 20 technical graduates have taken service with the company each year, but the needs of the service demand many more than this number annually, and measures will be taken to more widely publish the company's invitation. The "special apprentice" class, to which the graduates are assigned, now has a four years' course. The line of promotion is not determined by any rigid rule, but care is taken to see that each individual is fully trained in all the departments of the work with which he is likely to have to deal when he becomes an officer. The Altoona yards, where the novice takes his first lesson in railroad operation, now contain 210 miles of track; and the Altoona shops, as everyone knows, constitute in themselves one of the best technical schools in the world.

Press despatches from Lincoln, Neb., say that Governor Sheldon changed his mind and approved the 2-cent passenger fare bill in that state, for without his signature it could not have gone into effect soon enough to please the people. The same despatch says that every railroad in the state has announced that it will comply with the law. The legislature of North Dakota has passed a bill limiting passenger fares to 2½ cents a mile. The legislature has adjourned, and the bill is now in the hands of the Governor. The lower house of the Illinois legislature has passed a 2-cent fare bill, and it is regarded as certain that the measure will become a law, though there are details on which the House and Senate have yet to agree. In the constitution of the new state of Oklahoma, which is now being prepared, there is a provision limiting railroad fares to 2 cents a mile, with certain exceptions where that rate can be shown to be unreasonably low.

A controversy between the Southern Pacific Railroad and its telegraph operators has been referred to a board of arbitrators, who are requested to act under the federal law of 1898. The arbitrator named by the railroad is R. H. Ingram, of Los Angeles; the one named by the operators is H. B. Perham, of St. Louis, and the third, who has been named by the chairman of the Interstate Commerce Commission and the Commissioner of Labor, is Prof. Emory R. Johnson, of the University of Pennsylvania. Mr. Ingram is General Superintendent of the southern district of the Southern Pacific, and Mr. Perham is the chief of the Telegraphers' Brotherhood. The arbitrators are to meet in San Francisco. The questions to be submitted to arbitration are given in the newspapers as follows: "First, whether members of the Order of Railroad Telegraphers in the employ of the railroad shall legislate for train despatchers respecting rates of pay, hours of service, etc.; second, whether the hours of service on Sundays shall be reduced to five hours; third, whether there shall be an increase in the salaries of the telegraphers." Consideration will also be given the question of eliminating from the operation of the schedule certain important agencies where the duties of soliciting traffic are paramount. Under the law both parties agree to abide by the decision of the board of arbitration, which shall continue in force for a period of one year.

The premium for absurdity in railroad rate legislation seems likely this year to go to Alabama. Up to a recent date we have expected that the award would go to Texas. The law makers of Texas have had long experience in the concoction of tricks for juggling railroad rates, while still preserving an appearance of fairness, and in former years have easily distanced all competitors; but this year, with the fountain of free rides frozen up, and two-cent fare bills under discussion in nearly every state in the Union, there is no monopoly of ingenuity in this line, and many states have come well to the front. The Alabama example, to which we refer, is a bill limiting the charge per 100 lbs. for extra baggage to 10 per cent. of the ticket fare. In a protest against this bill, which has been sent to the legislature by President Milton H. Smith, of the Louisville & Nashville, it is shown that under the proposed law the charge for extra baggage will, for short distances, be much less than half the charge for carrying the same goods on a freight train, while for distances as high as 200 miles there is still a great difference. Mr. Smith gives eight examples, in all of which the prices for both freight and baggage are based on rates fixed or proposed to be fixed by the legislature. Taking the baggage of a certain drummer, who carries ten pieces, weighing 2,000 lbs., Mr. Smith shows that for five miles the passenger and his baggage (all but 150 lbs. being charged for) must be carried for $1.06; by freight, at the rate fixed by the Senate bill last month, the charge for the baggage would be $2.40. For 59 miles the passenger's ticket, at 2½ cents, would be $1.48; baggage—1,850 lbs. at 14¾ cents—$2.73; total, $4.21; charge for 2,000 lbs. of freight, same distance, as per statute, $8.20.

Some New Scherzer Bascule Bridges.

The double-track Scherzer rolling lift bridge built for the Newburgh & South Shore Railway across the Cuyahoga River at Cleveland, Ohio, was described in the *Railroad Gazette*, Dec. 16, 1904. The location plan of the new bridge showed closely adjacent thereto a single-track center-pier swing bridge of the Cleveland Terminal & Valley Railroad, a constituent of the Baltimore & Ohio. The good results given by the Newburgh & South Shore bridge induced the Baltimore & Ohio to replace its swing bridge with a double-track bridge of the Scherzer type to accommodate the rapidly increasing traffic. The new bridge is virtually of the same dimensions as its neighbor on the Newburgh & South Shore, the principal difference between the two being in the method of counterweighting. In the later bridge the counterweight consists of a concrete composition enclosed and protected by steel plates. The bridge is a simple truss, the movable span being 160 ft. center to center of bearings. It is designed to carry the heaviest railroad loadings and is moved by electric motors.

Fig. 1 shows the bridge during erection when nearing completion, it being erected in the upright position. The bridge in the foreground is that of the Newburgh & South Shore. The new bridge was placed in service last fall. Its construction was in charge of J. E. Greiner, Assistant Chief Engineer of the Baltimore & Ohio. The Scherzer Rolling Lift Bridge Company, Chicago, furnished the designs, plans and specifications for the superstructure, operating machinery and operating equipment; also consulting engineering services. The King Bridge Company, Cleveland, is the contractor for the superstructure.

A duplicate of this Baltimore & Ohio bridge is now being built for the Government Railways at Port Soudan, Africa. Two similar double-track Scherzer bridges are being built for the Buenos Ayres Great Southern Railway at Buenos Ayres, Argentine Republic; also a long-span double-leaf bridge for the Burma Railways, India.

The New York, Chicago & St. Louis is likewise building a similar double-track Scherzer bridge across the Cuyahoga river at Cleveland to replace a single-track swing bridge on its main lines through the city of Cleveland. The base of rail of this bridge will be 70 ft. above the river; only a partial opening of the new bridge will therefore be required for even the tallest masted vessels.

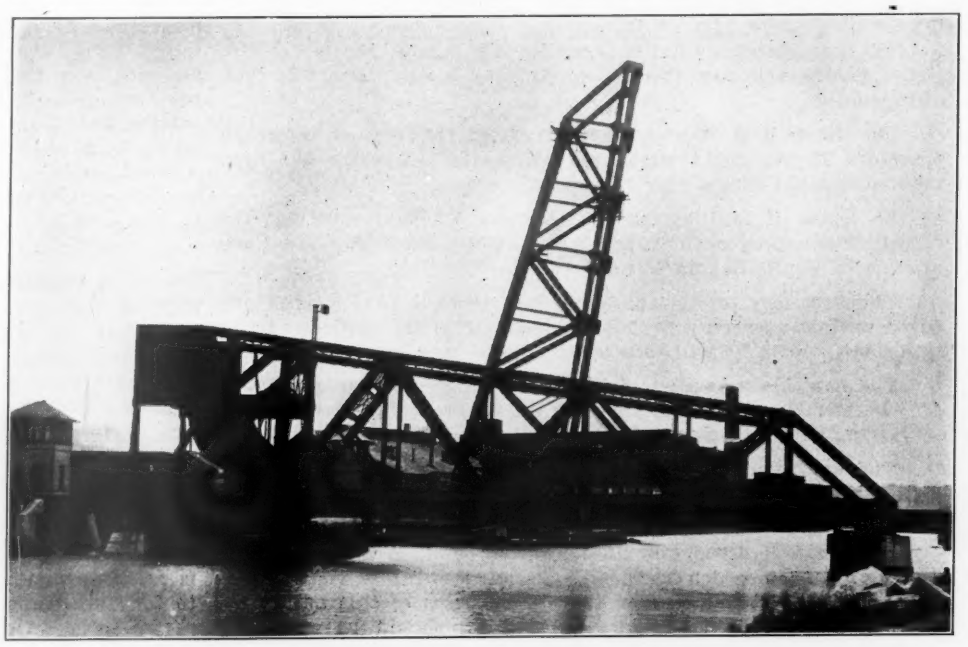


Fig. 1—Scherzer Rolling Lift Bridge at Cleveland, Ohio; Baltimore & Ohio.

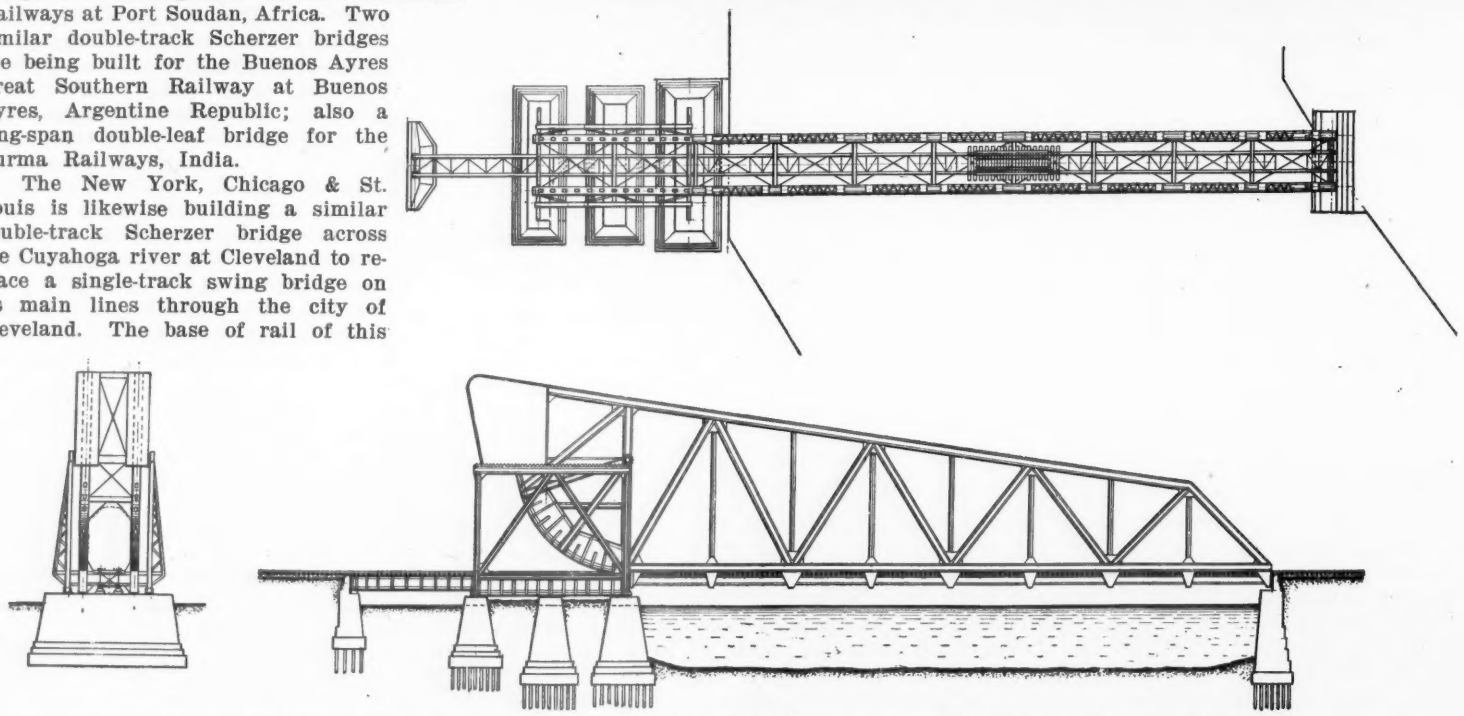


Fig. 2—230-ft. Span Single Leaf Scherzer Bridge Building for the Baltimore & Ohio at Cleveland.

The Baltimore & Ohio is building a very long span single-leaf Scherzer bridge to replace a center-pier swing bridge across the old channel of the Cuyahoga river. It is being erected in open position, thereby avoiding interference with or delay to either the railroad or the water traffic through the old swing bridge. The movable span of this bridge is 230 ft. long, center to center of bearings. The general design and dimensions are shown in Fig. 2, herewith. It is the longest span single-leaf bascule bridge yet built, and is only exceeded in length of span by the double-leaf Scherzer bridge across the Chicago river at the entrance to the Grand Central station, built in 1900, the movable span of which is 275 ft. The long spans in both instances are necessitated by the railroad tracks crossing the channel at an acute angle.

The four-track Scherzer bridges of the New York, New Haven & Hartford at Cos Cob and Westport, Conn., and the first double-track portion of a four-track bridge across the Housatonic river, have all been placed in service within the past year. Other four-track bridges of this type are building for this railroad across Neponset river, Massachusetts; Niantic river, Connecticut; Seekonk river, Rhode Island, and six-track bridges across the Bronx river and across Eastchester Bay, New York. All of these new bridges replace center pier swing bridges. They are designed to carry with increased safety the heavy passenger and freight traffic of this road and also facilitate traffic over its electrified lines. Substantial progress has been made on two double-track Scherzer bridges for the Norfolk & Western Ry. over the eastern and southern branches, respectively, of the Elizabeth river at Norfolk, Va., and upon two similar bridges for the Brooklyn Rapid Transit System. The company is also furnishing designs for numerous other railroad, electric railway and highway bascule bridges both in the United States and abroad, the present year promising to be more active than any previous year.

Street Car Fenders in Massachusetts.

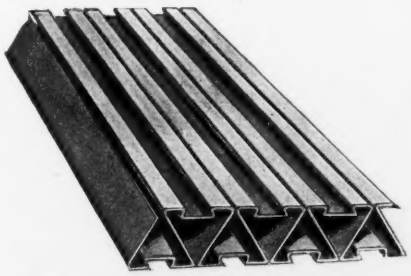
Circulars have been sent by the Massachusetts railroad commissioners to every street railway corporation in the state requiring them to make selection of the fenders preferred by them for use on their cars. Then these fenders will be examined by the commission and will be approved if they are believed to meet the conditions. Of the 27 different kinds of fenders tested by the railroad commissioners last year the commission is ready to approve several, and it will not shut up any corporation to the use of any

particular design. The Boston & Northern is making experiments of its own to determine which of several good inventions shall be adopted.

Cellular Steel.

Cellular steel is a new fireproof building material for floors, doors, partitions, decks, cars, etc. It is usually made of No. 24 galvanized sheet steel, pressed into triangular cells, as shown by the accompanying engraving, each side being about 2 in., and the triangles touching continuously. It is made either plain, or countersunk top and bottom for the reception of plaster or cement. The units are interchangeable and are made to form a continuous surface by slipping adjoining edges or cells one within the other. This affords a double-web reinforcement every few inches. The sheets or sections are 6 ft. long or less, as desired, and 7 in. wide. The weight is 4½ lbs. per square foot and the strength is given at over 600 lbs. per square foot for 6 ft. spans, without concrete or flooring.

For flooring, the sections are laid directly on the floor beams, the ends being tied together by metal straps on top of the sections, which are secured to the beam flanges by clips held to the floor by screws. The cellular steel may be covered with concrete as a preservative and as a base for terrazo, mosaic or other finished flooring. The under surface of the cellular steel may be plastered and finished as any other plaster ceiling.



Cellular Steel Building Material.

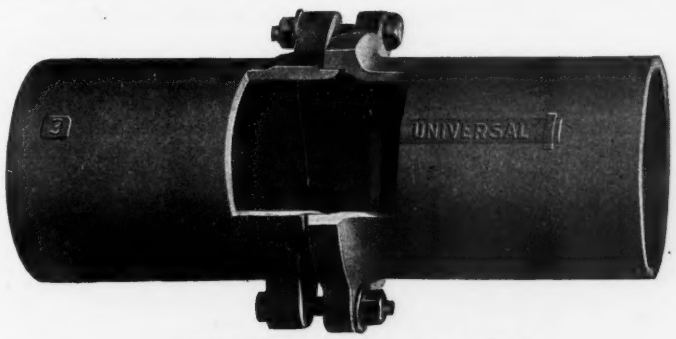
Cellular steel may be used for beam or column coverings, and for roofing, in the latter case being covered with pitch and clay, or tar and gravel, and will not shrink or crack. The purlins may be 6 ft. centers or less. It is also used for sewer covering. Other advantages are, saving of time in construction, saving of weight, and ease of loading for transportation.

Its use in floor construction has been approved for the City of New York, after suitable fire and water tests. Among the buildings in which it has been used is the Second National Bank building of Cincinnati, Ohio, a new ten-story structure. The National Steel Co., New York, is maker, and S. P. Holmes & Co., Chicago, are Western representatives.

"Universal" Cast Iron Pipe.

"Universal" cast iron pipe was designed to overcome the troubles experienced with, and the consequent objections to, the ordinary form of such pipe and the packed joints used with same. These joints are a constant source of leakage, either through themselves or because of their rigidity causing fractures due to their inability to adapt themselves to withstand the forces of expansion and contraction, vibration and settling.

The joint of "Universal" pipe has no packing and is formed by the contact of iron on iron. A true and slightly tapered spigot end fits into a taper, slightly smaller, in the hub of the adjacent length, the two being drawn together by bolts passing through lugs on opposite sides of the pipe. It is claimed that the joint will make up thoroughly and permanently tight under all conditions; and that



"Universal" Cast Iron Pipe Joint.

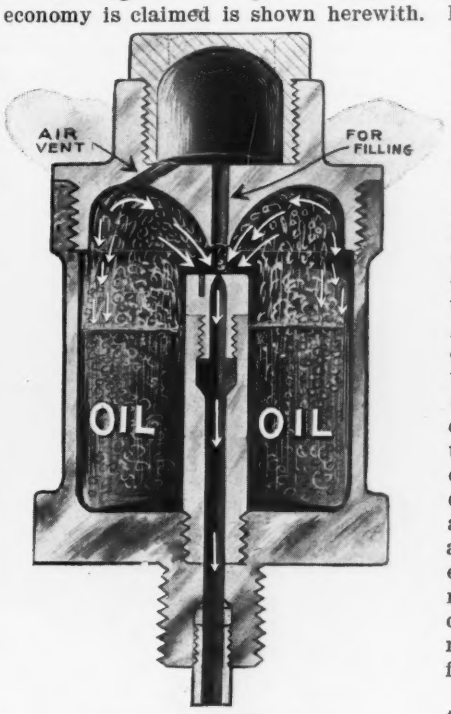
leakage of the main through fracture and like damage is minimized. A soft iron of high tensile strength is used in making the pipe to permit machining and give greater strength to the body of the pipe. The machined tapered joints take up the expansion and contraction in the line without leakage or strain, and at the same time provide connections of such flexibility as to be unaffected by the uneven settling and jars and vibration commonly experienced. Also, this pipe can be swung through considerable curves without producing leakage at the joints, an instance being a 5-in. compressed air line carrying 75 to 90 lbs. pressure, where the bend amounts at some points to over 6 in. in 6 ft., and the line remains tight.

It is further claimed that practically no trouble from electrolysis is experienced with this pipe, as it forms a continuous conductor for the current, while the packed joints of the ordinary pipe cause the current to divert around them through the ground, producing deterioration. A suitable wire connection should, of course, be made at the point nearest the generators to prevent electrolytic action at that point.

The pipe is made in 6 ft. lengths, with shorter lengths varying from 6 to 60 in. Use of these lengths and the nipples furnished enables any desired length of pipe or distance between fittings to be obtained. This also makes the pipe easy to handle and cheapens the cost of laying. The pipe is made by the Central Foundry Co., New York. Julian L. Yale & Co. are Chicago agents for it.

The Bangs Automatic Oil Cup.

A design of oil cup for locomotive use for which considerable economy is claimed is shown herewith. It is the Bangs automatic, being arranged to feed only when the engine is in motion, and ceasing when the engine stops. Steady and uniform lubrication is obtained, it is claimed, with a minimum of attention. The cup is made of aluminum, brass or iron, and is of simple, durable construction, there being no springs or glass in its make-up. It can be placed in any position on the eccentrics, cross-heads, crank arms or reciprocating bearings, the motion of the engine causing the oil to be dashed over the feed-pipe aperture and equal amounts to pass through each time. The sediment remains at the lower part of the cup where it cannot enter and clog the feed.

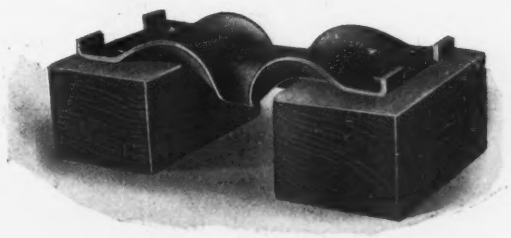


Bangs Automatic Oil Cup.

Besides the locomotive type, Type A, it is made for various other applications, such as stationary and marine engines, automobiles and bicycles. The Bangs Automatic Oil Cup Co., Milwaukee, Wis., is the maker.

The Abbott Rail Joint Plate.

The ordinary angle bar or fish plate rail joint is in many respects the most satisfactory joint that has yet been produced, but it has an inherent defect of lack of strength due to its limited section when used under the heavy wheel loads of present practice.



Abbott Rail Joint Plate.

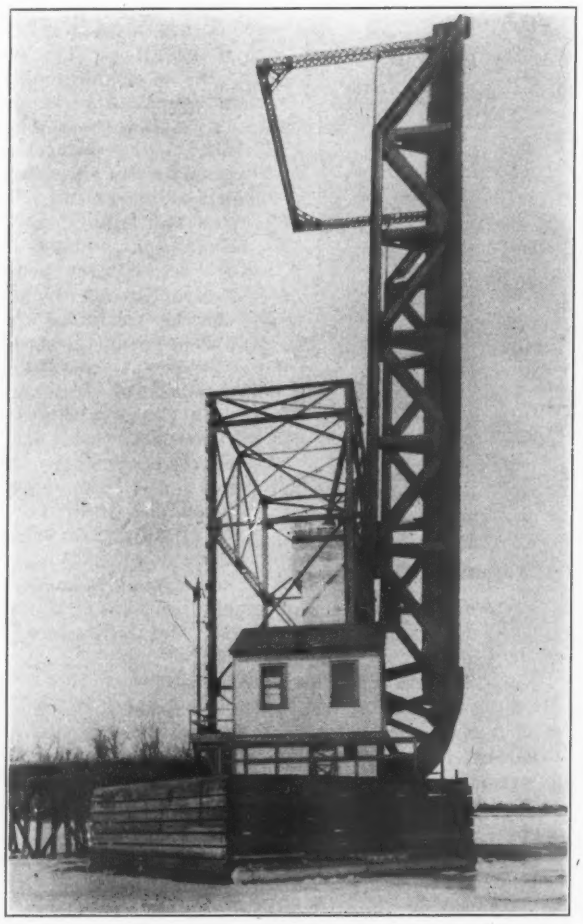
The Abbott rail joint plate, shown in the accompanying illustrations, was designed to provide the necessary strength and stiffness for the angle bar splice while still retaining its essential features of simplicity, low cost and ease of application. The construction is simple, consisting of one piece made from a flat plate $^{7}/_{16}$ in.

Angle Bar Joint With Abbott Joint Plate.

thick and of a length and width to correspond with the angle bar with which it is used. The downturned flanges at the center have a depth of 3 in. and a straight lower edge 1½ in. long. The upturned flanges extend from each end of the lower edge towards the ends of the plate 9½ in. each way from the center, making a

total length of flanging of 19 in. The greatest depth is at the center at the point of maximum stress. This combination of reversed top and bottom flanging makes proper provision for all stresses in the plate between the joint ties. The plate is given a slight camber in the center to insure that the ends of the rails first take a bearing, thus bringing the support of the plate into action before any deflection takes place in the splice bars. The upturned end or corner lugs act as "anti-creepers" by preventing the splice bars from moving relatively to the ties and also as guides for the rails to hold them in line in case the splice bars break or become loose.

The material from which the plate is made is a higher carbon steel than is used for the splice bars and has greater elasticity. With an 80-lb. rail section it is claimed that the vertical resistance is increased nearly 100 per cent. over the resistance of an ordinary angle bar joint. In lighter sections the increase is still greater. The plates may be applied to existing track which is breaking down at the joints under heavy loads and greatly prolong the life of the track. There is practically no wear on the plate and it may be used over and over again in renewals on curves where the wear on the angle bars is as rapid as the wear on the rails.



Side View of Bridge Open. Note Counterweight.

Many patent rail joints necessitate a special arrangement of joint ties before they can be put in place. The Abbott rail joint plate can be installed after track laying is completed and is applicable to any two-tie joint in either old or new track. In putting in switches or crossings where it is not practicable to use anything but angle bars, the plates can be left out and again continued beyond.

For step joints the usual form of compromise angle bar can be used and a simple flat plate of thickness equal to the difference in height of the two rail sections can be laid on the joint plate under the low rail. This gives a connection which can be made to hold surface as well as line. With this joint plate an ordinary angle bar joint can be insulated by using a continuous sheet of pressed fiber to fit around the rail section covering all the surface below the top and sides of the rail head. Angle bars of reduced size must be used to make a good fit but the joint plate supplies all the necessary vertical stiffness.

The Lackawanna Steel Co., 100 Broadway, New York, makes and sells these joint plates.

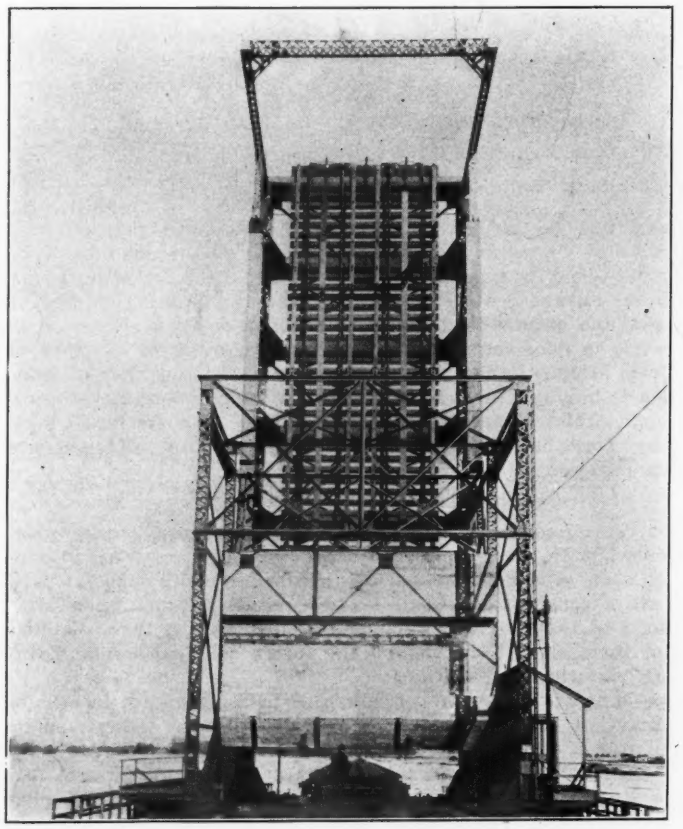
Prussian Hours of Labor.

In the State Railroad shops in Prussia the hours of work were reduced from 9½ to 9 on January 1, 1906. Inquiries among the authorities indicate that the result has been satisfactory all around. Most of the men are paid by the piece, and, as a rule, these have done as much and therefore earned as much in 9 hours as previously in 9½ and have been much more contented.

Strauss Trunnion Bascule Bridge; New Jersey Short Line.

The New Jersey Short Line, a double-track interurban line now building between Philadelphia and New York, crosses the Rahway river about four miles below Rahway, N. J. This river is navigable, requiring a drawbridge and a 150-ft. double arm plate girder draw span was originally designed for the crossing. It was later abandoned, however, and a Strauss design of trunnion bascule substituted. Views of the finished span are shown herewith.

The moving leaf has two riveted pony trusses with box-girder sections. The fore part is a Warren truss and the tail end is polygonal. The trunnion is located in the top chord at the junction point of the two parts mentioned, and is the center from which the truss members radiate, as well as the point to which the entire dead and half of the live load of the moving leaf is transmitted. The moving leaf comprises, in addition to the two trusses, all that part of the floor system beyond the break in the floor ahead of the trunnions. This part of the trusses is held laterally by deep knee braces at each floor-beam and by angle laterals. The tail ends are unsupported laterally beyond the trunnion, but the width of chord is exceptionally great in proportion to their unsupported length, and the tail ends are fully as stiff as the remainder of the trusses. The function of the tail end is to transmit the effect of the counterweight, which is pin-connected to it at the intersection of the two end members.

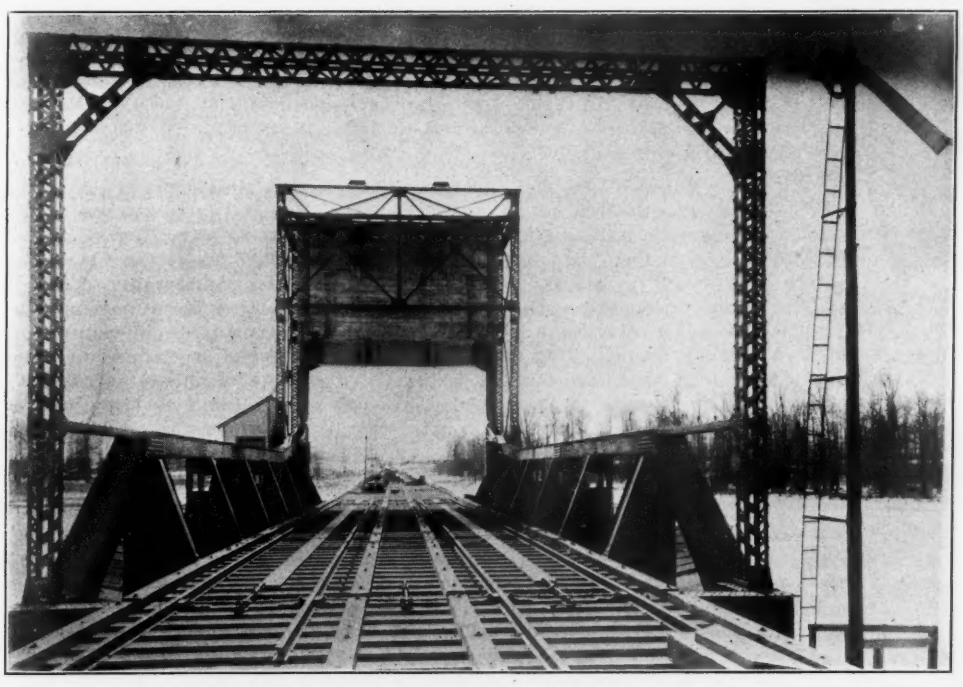


End View of Bridge Open. Note Counterweight.

The trunnion supports are two cast-steel journals riveted to a pair of short vertical posts, one on each side of each truss. The outer posts form part of two latticed frames, which are connected transversely by latticed struts above the clearance line and by top laterals, forming an enclosing tower for the counterweight as well as a support for the counterweight link. Heavy knee braces hold the outside posts laterally. The inside trunnion posts are riveted to the front floor-beam of the fixed approach, while the rear tower posts are riveted to the rear floor-beam of the fixed approach. The longitudinal bracing of the inside trunnion post is by means of a batter post and a horizontal strut to the rear floor-beam, acting in connection with a bottom lateral system of angle bracing. The fixed floor is supported on stringers spanning the space between the fixed floor-beam and by brackets to the break in the floor. This form of tower construction is to give solidity and stiffness.

The counterweight is concrete carried by a steel counterweight frame, which consists of two central vertical legs riveted to a main cross girder just above the traffic clearance line. At the top the posts are held by a cross strut, which with some diagonal shear bars is embedded in a concrete block 31 ft. 8 in. wide by 8 ft. thick by 22 ft. 9 in. high, built upon the cross girders as a base and embedding also the upper part of the steel legs, the whole forming the counterweight proper. The upper end of the counterweight frame is pin connected to a pair of braced links, which in turn are pin connected to the fore end of the tower. The relation of the link and the counterweight frame to the tail end of the truss

and the tower is such that the link is equal to and parallel with a line passing through the trunnion and the counterweight pin, while the leg of the counterweight frame is equal to and parallel with a line through the trunnion and the front link pin. The counterweight frame, therefore, as a member of a flexible parallelogram, can alter its relative position to the trunnion without changing from the vertical, thus maintaining an exact balance as the bridge opens and closes. The counterweight itself is high enough to permit such dimensions as are required for the use of concrete instead of cast-iron. Its point of application, however, is low and the center of gravity remains in the center of the trunnion close to the base of the rails. In other words, a high counterweight is obtained without a high center of gravity and the consequent low factor of stability.



Portal View, Strauss Bascule Bridge, Rahway, N. J.

The machinery is located on top of the pier on each side of the tower. It comprises two separate trains of gears and two driving pinions, meshing with cast-steel racks fitted to the tail ends of the trusses of the moving leaf. There are two 15 h.p. direct-current railway type driving motors, which, with the machinery, are enclosed in timber housings, the roofs of which are flush with the base of rails. On one side this roof forms the floor of the operator's house, which contains the controller, switchboards and the hand levers for the brakes, truss and rail lock and the semaphores. A winch for hand operators is also contained in the operator's house, as well as an indicator, showing the position of the leaf, and an air whistle instead of the old-fashioned bell. Walks and stairways lead to all the machinery parts and the tower is fitted with a ladder on the rear post, which gives access to the link pins.

The bridge has end shoes designed to act as buffers and absorb the impact of the leaf as it descends. For the upward movement an automatic motor cut-out is provided as well as bumping blocks of white oak on the trunnion post and a corresponding engaging shoe on the tail end. Two one-arm semaphores were furnished as a part of the bridge equipment; also two automatic signal lights, showing red when the bridge is closed and green when it is open; also four fixed lights on the piers.

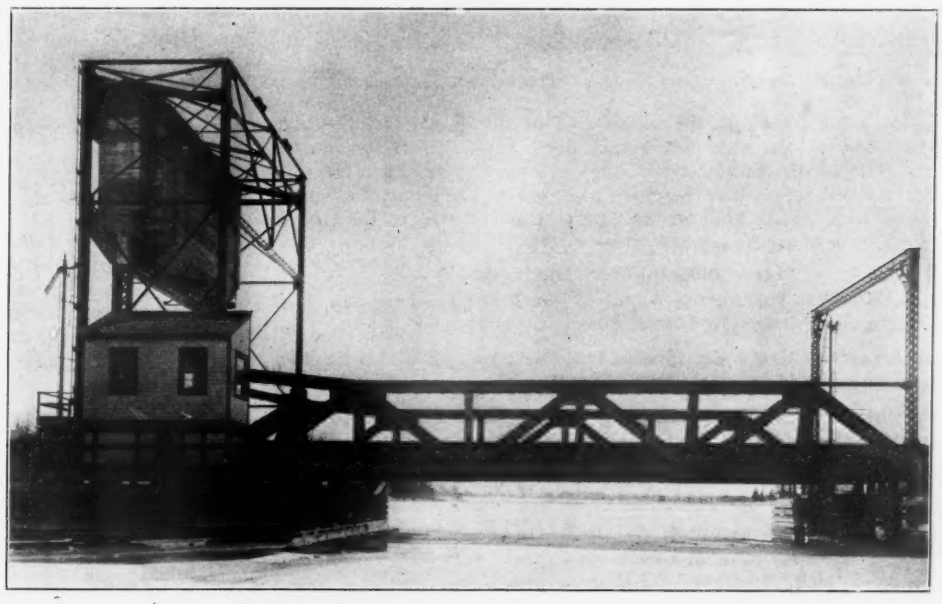
The road being an interurban line, it was necessary to provide for trolley wires. At the end of the leaf this was done by riveting a structural steel trolley arch to the end floor-beam and bracing it back to the truss in the line of the top chord. At the tower end T-iron brackets were built into the counterweight for the attachment of insulated brass pans to guide the trolley. The trolley wire of the leaf passes over a sheave in the front pan and thence to a compensator on the front face of the counterweight, the device being such that the wire is always kept taut whether the bridge is open or closed. In the open position the trolley wires ride on iron rollers at the top of the tower. The wire being dead when the bridge opens, there is no transmission of current to the bridge metal. The approach wires are supported on the end frame of the tower at one end and to a trolley arch on the fixed approach at the other end.

The bridge floor has 8-in. x 9-in. x 22-ft. ties continuous over both tracks, secured to the stringers by 4¾-in. bolts for each tie. There are the usual timber guard rails, and also two lines of walking planks. The rail latches have a toggle action and act sidewise. The truss lock is a longitudinally moving tongue engaging a slot on the end shoes. No tail lock is provided, there being no live load on the tail end and no tendency therefore for the bridge to open under load.

The substructure of the bridge comprises a concrete pivot pier and a pile rest pier. The former is U-shaped to suit the tower and rests on short piles driven to a stratum of shale. Its construction was carried on by means of a puddled cofferdam, which was designed to remain in place and serve as a fender. For this purpose the puddle was removed after the pier was finished and replaced by broken stone. Ample end protections are provided by this fender as the views show. The rest pier is similarly protected by a fender. The footing of the trunnion post consists of I-beam bolsters suitably anchored in the concrete. The rear posts have heavier anchorage to provide for the wind stresses.

The contract requirement for speed of operation calls for a leaf movement of one minute, and a quarter of a minute for the operation of the locks. The motion is smooth and regular and there is no tendency to race. The power required is about 20 amperes at 450 volts. The hand-operating mechanism raises the bridge in 30 minutes on the high-speed gear and in 60 minutes on the low-speed, with one man at the winch. This mechanism is an emergency device and ordinarily disconnected.

The bridge crosses the river at right angles, the clear span being 65 ft. The distance from the center of the trunnion to the rest pier shoe is 83 ft. The length of the tail end or counterweight arm is 13 ft. The tower is 17 ft. c. to c. of posts parallel to the bridge and 33 ft. 6 in. across. Its height from top of masonry is 53 ft. 3 in. and from base of rails 43 ft. 4 in. The distance center to center of trusses is 30 ft. and the total weight of metal in the bridge is 391,000 lbs.



Strauss Bascule Bridge at Rahway, N. J.

The notable features of the bridge are its straight line construction, the absence of counterweight pits, and the concrete counterweight. The distance from base of rail to mean high water is only 10 ft. 6 in. and the cost of counterweight pits would have been prohibitive. All the main pins have been provided with double-lock keys to prevent their accidental dislodgement. The bridge was designed and built by the Strauss Bascule & Concrete Bridge Co., Chicago. It is now completed and ready for use as soon as the road is finished.

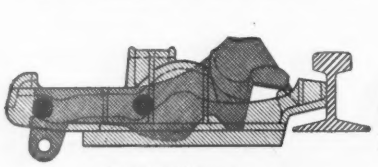
Reinforced Concrete Roofing Tile.

The roofing tile illustrated herewith is made of concrete reinforced with 18-gage expanded metal. It is very large, each tile having 8 sq. ft. exposed to the weather, with 4-in. laps and ¼-in. play at the sides. It is ⅞ in. thick and weighs 13 lbs. per sq. ft. Its strength is sufficient to bear any weight to which a pitch roof is subjected, it is claimed. It is laid directly on the purlins, no sheathing being interposed. It is neither nailed nor wired, being held in place by its own weight and the interlocking feature provided. It is claimed to be waterproof, never scales, cracks or blisters, requires no painting or repairing, and no storm short of that which can wreck the whole building will dislodge it. Its first cost is about the same as for other substantial roofs. It has already been applied to the roofs of many big buildings all over the United States, and is being used on the buildings being erected at Gary, Ind., for the United States Steel Corporation, and on the big plant of the Pittsburg Plate Glass Co. at Crystal City, Mo. It is called the "Bonanza" tile. The Hunkins-Willis Lime & Cement Co., St. Louis, Mo., is general agent for it.

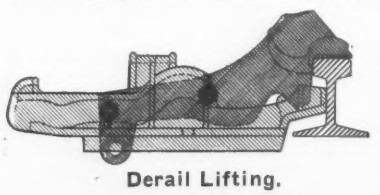
"Bonanza" Roofing Tiles.

Hayes Lifting Derail.

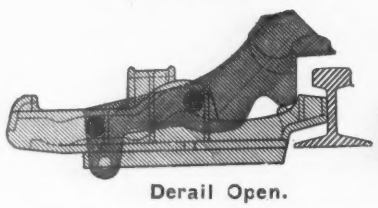
There are now in use on 220 railroads over 14,000 of the Hayes lifting derails shown in the accompanying illustrations. The new model A derail recently put out embodies a number of improvements. In the older styles the derail block was held on the rail by the pins in the cam slot. This is accomplished in the new model by forming a seat at the front end of the guide box which gives a bearing for a lug found on the under side of the derail block, which drops in front of the seat when the block comes down on top of the rail. The block cannot move sideways on the rail without lifting clear of the seat. The top and back cross braces of the guide block have been made heavier to add to the rigidity of the block. The Hayes Track Appliance Co., Geneva, N. Y., is the maker.



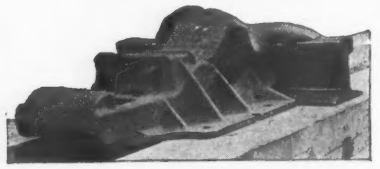
Derail Closed



Derail Lifting.



Derail Open.



Derail on Track.

Manufacturing and Business.

W. A. Hughes, Purchasing Agent of the Pullman Company, died at his home in Chicago on March 8th.

The American Car & Equipment Co., Chicago, has sold a number of tank cars to E. H. Young, Galveston, Tex.

The Chicago Railway Equipment Co., Chicago, has moved from the Great Northern Building to the Fisher Building.

Clive Runnells, Manager of Sales for the Western Steel Car & Foundry Co., has resigned to go to McCord & Company, Chicago.

The Draper Manufacturing Co., Port Huron, Mich., has sold to the Union Pacific R. R. a McGrath pneumatic turntable motor for use at Sidney, Neb.

The Lock Joint Pipe Co., 346 Broadway, New York City, has received a contract from the Charlotte Harbor & Northern to protect all the piling of its bridges and wharves in the state of Florida with lock joint pipe.

The Friestedt Interlocking Channel Bar Co., Chicago, has been bought by the Carnegie Steel Company. Arthur A. Friestedt, hitherto with the former company, will be Sales Manager of the steel piling department of the Carnegie company, with office at Pittsburg.

The name of The Lantry-Sharp Contracting Co., Kansas City, Mo., has been changed to The C. H. Sharp Contracting Co. C. H. Sharp continues as President and General Manager. The offices have been moved from the Gumbel Building to 708-9-10 Long Building.

The Pilling Air Engine Company, Detroit, Mich., is getting out plans and specifications for a new factory building, which will more than double its present capacity. It has bought two acres of land to allow for future expansion in making hoisting machinery and railroad equipment. J. C. Fleming is President and Manager.

The Hicks Locomotive & Car Works, Chicago, has established a southern office at Hattiesburg, Miss., primarily to make the lumber purchases for the company. It is in charge of J. F. Johnston, with the title of Southern Lumber Agent. He has been connected with southern lumber interests for 15 years, and will have charge of the purchasing, inspection and shipping departments of the Hicks works in the South, and will attend to sales of its products when opportunities present.

Robert E. Garrick, formerly General Superintendent of the Unit Concrete-Steel Frame Co., Philadelphia, Pa., and later general engineer with Tucker & Vinton, New York, is now with the General Fireproofing Co., Youngstown, Ohio. Mr. Garrick's experience has been extensive in planning and superintending the construction of reinforced concrete work, and in his present position his attention will be given to the sale and installation of the company's pin-connected girder frame. This type of girder reinforcement is claimed to possess an exclusive feature in that it provides a complete mechanical tie by a link and pin connection over each column or beam intersection which does not in any way depend upon the adhesion of the concrete to the steel.

J. R. Lovejoy has been appointed General Manager of the Sales Department of the General Electric Company. Mr. Lovejoy was born at Columbus, Ohio, in 1863. After a post-graduate course at the Ohio State University, from which he received the degree B. Sc., he entered the service of the Thomson-Houston Electric Co. at Lynn, Mass., August, 1886. He graduated from what was then known as the "expert course" to take up engineering work in the Boston office of the company. Later he was employed at headquarters, and when the Thomson-Houston Company was merged in the General Electric Co. in 1892, he became General Manager of the Supply Department. In 1900 he was made also Manager of the Railway and Lighting Departments. He is an officer and a director in several subsidiary companies; a director and member of the executive committee of the Schenectady Trust Company; a member of the American Institute of Electrical Engineers, the Franklin Institute and the American Society for the Advancement of Science, as well as several organizations pertaining to electrical science; president of the Mohawk Golf Club of Schenectady; a member of the Mohawk Club of Schenectady and the University Club of New York.

OBITUARY NOTICES.

Arthur V. Lomlin, Treasurer of the Missouri, Kansas & Texas of Texas, died in Dallas, Tex., on March 12 of malarial fever. Mr. Lomlin was 36 years old.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Canadian Society of Civil Engineers.

At a meeting of the Electrical Section held March 14, a paper by B. T. McCormick on "Effect of Armature Reaction in Synchronous Motors and Rotary Converters" was presented.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Bennettsville & Cheraw.—The following new officers have been elected: J. J. Heckart, President, succeeding J. A. Drake; George Burchill, Sumter, S. C., Secretary and Treasurer; H. A. Page, General Manager.

Delaware & Hudson.—Alexander E. Orr, Vice-President, has resigned. He remains a member of the Board of Managers and of the Executive Committee.

Missouri Pacific.—Stuyvesant Fish, formerly President of the Illinois Central, has been elected a Director of the Missouri Pacific, succeeding James H. Hyde. J. J. Slocum has been elected a Director, succeeding Russell Sage, deceased.

Santa Fe, Prescott & Phoenix.—George C. West has been appointed Auditor, succeeding Paul P. Hastings, appointed General Freight and Passenger Agent.

Operating Officers.

Bennettsville & Cheraw.—H. A. Page has been appointed General Manager, with headquarters at Bennettsville, S. C., succeeding

A. J. Matheson, Vice-President and General Manager. See same road under Executive, Financial and Legal Officers.

Chesapeake & Ohio.—J. A. Fox, Trainmaster at Covington, Ky., has been appointed Assistant Superintendent of the Kentucky division. G. H. Funk succeeds Mr. Fox.

Detroit, Toledo & Ironton.—H. A. Hardy has been appointed Trainmaster of the Northern division, with office at Napoleon, Ohio, succeeding W. H. Romoser.

Kansas City Southern.—A. G. Eggleston has been appointed Trainmaster at Shreveport, La., succeeding R. R. Sutherland, resigned.

Missouri, Kansas & Texas.—J. W. Walton, Superintendent at Parsons, Kan., has resigned to go to the St. Louis & San Francisco.

Pullman Company.—J. L. Woods, Assistant Superintendent at Cincinnati, Ohio, has been appointed District Superintendent at Detroit, Mich. J. P. McPhillips succeeds Mr. Woods.

Seaboard Air Line.—H. M. Waite, who has been appointed Superintendent of the Seaboard Air Line, with office at Birmingham, Ala., was born on May 15, 1869, at Toledo, Ohio. He graduated from the Massachusetts Institute of Technology in 1890, and began railroad work in that year on the Big Four as rodman; within a year he was appointed Engineer in charge of new lines and Engineer of Maintenance of Way of the St. Louis division. In 1893 he went to the Cincinnati, New Orleans & Texas Pacific as Division Engineer. For a year he was roadmaster of the Louisville & Southern, now part of the Southern Railway, but returned to the Queen & Crescent in 1895 as Superintendent of Bridges. Four years later he was appointed Superintendent of the Cincinnati division, and in 1906 Superintendent of the Chattanooga division, with headquarters at Somerset, Ky. Soon after Mr. Garrett's election as First Vice-President of the Seaboard Air Line, Mr. Waite followed him to that road.

Traffic Officers.

Cumberland Valley.—The office of the General Freight Agent has been moved from Harrisburg, Pa., to Chambersburg.

Midland Valley.—C. B. Hart, General Agent at Fort Smith, Ark., has been appointed to the new office of General Freight and Passenger Agent, with office at Muskogee, Ind. T.

Missouri Pacific.—W. D. Hurlbut, General Freight Agent in charge of Tariffs, Rates and Revisions, has resigned to go into other business.

New York, Chicago & St. Louis.—B. E. Morgan, Commercial Agent at Chicago, has been appointed Assistant General Freight Agent, with office at that city. J. H. Grant, Commercial Agent at Buffalo, has been appointed Assistant General Freight Agent at Cleveland, Ohio.

Santa Fe, Prescott & Phoenix.—Paul P. Hastings, Auditor, has been appointed General Freight and Passenger Agent, succeeding F. A. Jones, resigned to go into other business. See Santa Fe, Prescott & Phoenix under Executive, Financial and Legal Officers.

Engineering and Rolling Stock Officers.

Canadian Pacific.—J. E. Schwitzer, Principal Assistant Engineer, has been appointed Assistant Chief Engineer, with headquarters at Winnipeg.

Houston & Texas Central.—F. T. Jeans has been appointed Superintendent of Bridges, with office at Houston, Tex.

Northern Pacific.—W. C. Smith, Division Engineer at St. Paul, Minn., has been appointed Engineer of Maintenance of Way, with headquarters at St. Paul.

Purchasing Agents.

Chicago, Rock Island & Pacific.—W. K. Allen, Assistant to the General Purchasing Agent, has resigned.

LOCOMOTIVE BUILDING.

The Egyptian State Railways administration is inquiring for 70 American locomotives.

The Dry Fork Railroad, it is reported, has ordered one locomotive from the Baldwin Locomotive Works.

The Costa Rica Government Railways have ordered two locomotives from the Baldwin Locomotive Works.

The Pennsylvania, according to press despatches, has ordered 20 passenger locomotives from its Juniata shops.

The Central of Georgia, it is reported, has ordered 15 simple locomotives from the Baldwin Locomotive Works.

The Missouri, Kansas & Texas, it is reported, has ordered seven locomotives from the American Locomotive Company.

The Yuet-Han (China) has ordered from the American Locomotive Company two prairie type (2-6-2) tank locomotives.

The Yokohama, of Japan, has ordered five prairie type (2-6-2) tank locomotives from the American Locomotive Company.

The National Railway of Nicaragua is understood to have ordered one locomotive from the Baldwin Locomotive Works.

The Canton-Hankow (China) has ordered two eight-wheel passenger locomotives from the American Locomotive Company.

The Guanica Central, Porto Rico, has ordered one six-wheel (0-6-0) switch engine from the American Locomotive Company.

The Central of Brazil has ordered three Mallet compound locomotives, each to weigh 208,000 lbs., from the American Locomotive Company.

The Northern Pacific Terminal Co., Portland, Ore., is reported to have ordered two locomotives from the American Locomotive Company.

The Guatemala Government Railways (Central America) have ordered from the American Locomotive Company two four-wheel type (0-4-0) saddle tank locomotives.

The La Dicha & Pacific, which is being built on the west coast of Mexico by the Mitchell Mining Co., is in the market for second-hand 36-in. gage locomotives. The contract will be placed through the New York purchasing office, room 1220, Broad Exchange Building.

The South Manchuria Railway has ordered 20 consolidation and two inspection locomotives from the Baldwin Locomotive Works. The same road recently ordered 183 engines of different types from the American Locomotive Company, four of which have been shipped.

The Mexican National Sugar Refining Company, which is to build a railroad on its plantation near Cordoba, state of Vera Cruz, will shortly be in the market for two locomotives. The contract will be placed through the Eastwick Engineering Company, Limited, 32 Broadway.

The Vandalia, as reported in the *Railroad Gazette* of December 21 last, has ordered 11 simple freight mogul (2-6-0), two simple Atlantic (4-4-2), and six simple six-wheel switching (0-6-0) locomotives from the Schenectady works of the American Locomotive Co., for June delivery. The general dimensions for these locomotives were published in our issue of December 21, and the special equipment is as follows:

Air brakes	Westinghouse
Axles	Cambria
Bell ringer (for mogul)	Simplicity
Boiler lagging	Franklin Mfg. Co.
Brake-beams	Creco or Davis
Couplers	Tower
Headlights	Vandalia standard
Injector (for mogul and Atlantic)	Simplex
Injector (for switching)	Nathan Simplex
Journal bearings	Pennsylvania R. R. specifications
Piston rod packings	U. S. metallic
Valve rod packings	U. S. metallic
Safety valve	Coale
Sanding devices	Leach
Sight-feed lubricators	Nathan bull's-eye
Springs	Union Spring & Mfg. Co.
Steam gages	Ashcroft
Steam heat equipment (for Atlantic)	Penn. R. R. specifications
Tires—Driving wheel	Open hearth steel
Tires—Truck wheel (for mogul and Atlantic)	Paige steel
Tires—Tender wheel (mogul and Atlantic)	Schoen rolled steel
Other specialties (for mogul)	Walschaert valve gear

CAR BUILDING.

The Bristol (Tenn.) Street Railway will shortly buy some cars.

The Tuscaloosa (Ala.) Belt Railway is about to buy a gasoline motor car.

The Texas & Pacific is reported in the market for passenger equipment.

The Missouri, Kansas & Texas is about to let contracts for 2,500 freight cars.

The Meridian (Miss.) Light & Railway Company is about to buy some cars.

The Louisville (Ky.) Traction Company is reported to have ordered 50 cars.

The Nashville (Tenn.) Railway & Light Co. is reported to have ordered 30 cars.

The Missouri, Kansas & Texas has ordered 2,500 freight cars from the American Car & Foundry Company.

The Northern Electric Co., Chico, Cal., is said to have ordered 50 box cars from the American Car & Foundry Company.

The Louisiana & Arkansas, as reported in the *Railroad Gazette* of February 1, has ordered 300 box cars from Barney & Smith.

The Morrisey, Fernie & Michel, it is reported, has ordered 15 coal cars of 60,000 lbs. capacity from the Youngstown Car & Mfg. Co.

The Costa Rica Government Railways have ordered about 200 flat, box and stock cars from the American Car & Foundry Company.

The Colorado Midland is working on plans for 100 coal cars instead of 100 box cars, as reported in our advance sheet of February 27.

Brooke Smith, of Houston, Tex., is about to buy a gasoline motor car for use on the branch line of the Houston Electric Railway to Brooke Smith.

The Colorado & Southern, as reported in the *Railroad Gazette* of March 8, has ordered 100 Hart convertible cars from the Rodger Ballast Car Company.

The South Manchuria Railway has ordered a large number of box, gondola and flat cars. It is understood that most of these were ordered from the American Car & Foundry Co.

The Chicago, Milwaukee & St. Paul, according to press despatches, is about to build 3,000 steel underframe box cars at its West Milwaukee shops. A similar report several weeks ago was denied.

The Mexican National Sugar Refining Company, which is to build a railroad on its plantation near Cordoba, state of Vera Cruz, will shortly be in the market for from 50 to 60 cane cars. The contract will be placed through the Eastwick Engineering Company, Limited, 32 Broadway.

The Brooklyn Rapid Transit has ordered 50 elevated railroad motor cars from the Jewett Car Co., 50 elevated railroad motor cars from the Laconia Car Co., and 100 surface railway cars from the J. G. Brill Co. The elevated railroad cars will have steel frames and storm-proof vestibules.

The La Dicha & Pacific, which is being built on the west coast of Mexico by the Mitchell Mining Co., is in the market for 15 flat and six box cars of from 30,000 to 40,000 lbs. capacity. The contract will be placed through the New York purchasing office, room 1220, Broad Exchange Building.

The Kansas City, Mexico & Orient, as reported in the *Railroad Gazette* of February 15, has ordered 400 standard box cars and 200 36-ft. stock cars, both of 60,000 lbs. capacity, from the American Car & Foundry Co., for September delivery. The special equipment for both is as follows:

Bolsters	Bettendorf
Brake-beams	Chicago Railway Equipment Co.
Brake-shoes	Spear & Miller Co.
Brakes	Westinghouse
Brasses	Hewitt
Couplers	Climax
Door fastenings (for box)	Positive
Doors (for box)	Dunham
Dust guards	Ryan
Paint	American Car & Foundry Co.
Roofs (for box)	Chicago-Cleveland
Springs	Railway Steel Spring Co.
Trucks	Arch bar
Wheels	American Car & Foundry Co. (cast iron)

The Washington, Baltimore & Annapolis Electric, as reported in the *Railroad Gazette* of February 15, has ordered 19 passenger cars, four combination cars and two freight cars from the Niles Car & Mfg. Co., for July 15 to September 15 delivery. The passenger cars will be 51 ft. long, the combination cars will be 43 ft. long, and the freight cars will be 54 ft. long; all cars will be 8 ft. ¼ in. wide, and 9 ft. 6 in. high, inside measurements. The special equipment includes:

Axles	Standard Steel Co.
Brakes	Westinghouse
Brake-shoes	American Brake-Shoe & Foundry Co.
Couplers	Gould
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote
Draft rigging	Gould
Heating system	Consolidated Car Heating Co.
Journal boxes	Symington
Paint	Sherwin-Williams
Springs	Baldwin
Trucks	Baldwin
Wheels	Standard Steel Co.

RAILROAD CORPORATION NEWS.

Catskill Electric Railway.—Capt. Arthur M. Murphy, of Catskill, N. Y., has been appointed receiver of this company.

Chicago, Rock Island & Pacific.—See Rock Island-Frisco Terminal.

Cleveland, Southwestern & Columbus (Electric).—This company was incorporated on March 4 at Columbus, Ohio, to consolidate the Cleveland & Southwestern Traction Co., the Cleveland, Ashland & Mansfield Traction Co., and the Ohio Central Traction Co., together operating 170 miles of line. The new company is reported to have acquired the Mt. Vernon Electric Railway, owning five miles of line in Mt. Vernon, Ohio.

Great Northern.—Gross earnings for the month of February were $2,656,873, a decrease of $531,386, or 17 per cent. There were snow blockades during the greater part of the month. For the eight months ended February 28, 1907, gross earnings show an increase of a little over $800,000.

Havana Electric Railway.—At the recent annual meeting an entirely new board of directors was elected, which Cuban bankers, represented by Frank Steinhart, American Consul-General at Havana, control. The road was formerly controlled by William L. Bull, of New York, and Hanson Bros., of Montreal. Warren Bicknell has resigned as President of the Lake Shore Traction Co., of Cleveland, and has been elected President of the Havana Electric, succeeding Edwin Hanson.

Merchants & Miners Transportation Co.—See New York, New Haven & Hartford.

New York Central Lines.—Gross earnings for the month of February, 1907, were as follows:

New York Central & Hudson River	$6,562,113	Decrease	$20,011
Lake Shore & Michigan Southern	3,263,828	Increase	232,952
Lake Erie & Western	373,168	Decrease	40,536
Chicago, Indiana & Southern	217,072	Increase	29,773
New York, Chicago & St. Louis	808,315	"	56,783
Michigan Central	2,088,988	"	67,995
Cleveland, Cincinnati, Chicago & St. Louis	1,821,251	"	77,618
Peoria Eastern	225,342	Decrease	2,690
Cincinnati Northern	71,884	Increase	8,662
Pittsburgh & Lake Erie	1,022,316	"	57,563
Rutland	177,043	"	1,286

New York, New Haven & Hartford.—It is officially announced that the New York, New Haven & Hartford has sold the Boston & Philadelphia Steamship Co., recently bought, to the Merchants & Miners Transportation Co., in which company it has bought a half interest. The stock of the Merchants & Miners is to be trusteed, the New Haven road to nominate one-half the directors and the outside stockholders the other half, the odd director to be chosen by the trustees. The Merchants & Miners Transportation Co. owns 17 steamships which it operates from Boston and Providence to Baltimore and Norfolk, from Philadelphia to Savannah, and from Baltimore to Newport News, Norfolk and Savannah.

Pennsylvania.—At the sixtieth annual meeting of the Pennsylvania Railroad held in Philadelphia March 12, the company was authorized by the stockholders to increase the authorized capital stock from $400,000,000 to $500,000,000, and to issue $100,000,000 new bonds. Authority was also given to increase the yearly contribution by the company to the employees' pension fund from $300,000 to $500,000.

Pittsburg & Lake Erie.—See Wheeling & Lake Erie.

Rock Island Company.—The Rock Island-Frisco Terminal Railway has made a mortgage securing $5,000,000 first mortgage 5 per cent., 20-year, gold bonds jointly guaranteed by the Chicago, Rock Island & Pacific Railway and the St. Louis & San Francisco. Of these, $3,000,000 have been sold. The property consists of three tracts in St. Louis, one on the east side of Broadway, extending from Biddle to Collins street, on which the new freight depot is located; a second tract about 2½ blocks on the east side of Broadway, between Brooklyn street and the property of the American Brake Shoe & Foundry Co., and a third north of the Merchants' Bridge approach, with an area of about 100 acres, which will be used for a switching yard.

St. Louis & San Francisco.—See Rock Island-Frisco Terminal.

Southern Pacific.—This company and the Union Pacific are notable in their reports of January earnings, in that results were better than in the corresponding month of 1906, while most railroads are showing much poorer results; this is particularly noticeable in net earnings. Gross earnings of the Southern Pacific for January, 1907, were $10,695,975, an increase of $2,514,841, or 30 per cent.; net earnings were $3,344,690, a gain of $1,045,292. For the seven months ended January 31, gross earnings were larger by about $10,480,000, and net earnings were $5,929,000 more than in 1906.

Union Pacific.—Gross earnings for January, 1907, with 195 miles more operated than last year, were $5,949,772, an increase of $834,596 over 1906; net earnings, $2,704,768, a gain of $439,645. For the seven months ended January 31, 1907, gross earnings increased $4,000,000, and net earnings $2,000,000. See Southern Pacific.

Wheeling & Lake Erie.—This company has sold to the Pittsburg & Lake Erie the franchises and property of the Lake Erie, Youngstown & Southern, a projected line to give the Wheeling & Lake Erie a line to Youngstown, Ohio, where the L. E., Y. & S. owned terminal properties valued at about $500,000. The Pittsburg & Lake Erie will probably turn over the terminal properties and right-of-way where available to the Lake Erie & Pittsburg, which the Lake Shore & Michigan Southern is building from Lake Erie south to Youngstown to extend the Pittsburg & Lake Erie from that point, its present northern terminus, to Cleveland and Lorain.

ANNUAL CONSTRUCTION RECORD

The asterisk (*) denotes that contracts have been let or that work is under way. It is our policy to be as conservative as possible in using this designation and in the great majority of cases where the asterisk appears definite news has been received, usually direct from officers or incorporators, that contracts have been let or work has actually been begun. The date **(Mar. 16, 1906)** following an item indicates that nothing has been heard either officially or through press reports since last year's Construction Record was issued. New lines built during the past year are omitted, notice of their completion having been given in the regular weekly Railroad Construction column. The number of lines, extensions or improvements projected or under way in Canada and Mexico is presumably larger than those given, owing to the difficulty experienced in getting information from remote places.

A

ABILENE & NORTHERN.—See Colorado & Southern.

ALABAMA CENTRAL.—Projected from Tuscaloosa, Ala., north to Decatur, about 125 miles. O. C. Simmons, Chicago, is interested.

ALABAMA CITY, GADSDEN & ATTALA (Electric).—Proposed extension from Gadsden, Ala., to Noccalula Falls, five miles.

ALABAMA GREAT SOUTHERN.—Proposed branch from Wauhatchie, Tenn., to a connection near Lookout tunnel with Southern Railway.

ALABAMA RAILWAY & POWER COMPANY.—Organized to build from Chattanooga, Tenn., to Birmingham, Ala., 175 miles. H. T. Henderson, of Durango, Colo.; J. P. Montgomery, of Ashville, Ala., and C. L. Young, Jr., of Fort Payne, Ala., incorporators.

ALABAMA, TENNESSEE & NORTHERN.—Proposed extension from Aliceville, Ala., south 29 miles.

ALABAMA WESTERN.—See Illinois Central.

*ALAFIA, MANATEE & GULF COAST.—Building from Boca Grande on Charlotte Harbor, Fla., to Brownville, 60 miles. L. M. Fouts, 316 Duval Building, Jacksonville, Fla., General Manager.

*ALASKA CENTRAL.—Building from Seward, on Resurrection Bay, to the Tanana river, in the interior of Alaska, 500 miles; 70 miles completed.

ALASKA MIDLAND.—Organized in the state of Washington to build from Valdez, Alaska, to Eagle City. W. D. Hofius, Seattle, Wash., President. (Mar. 16, 1906.)

ALASKA RAILROAD.—Proposed line from Cordova Bay, Alaska, via Copper river valley to Eagle, 525 miles. Andrew F. Burleigh, New York, interested.

ALBANY & NORTHERN.—Proposed extension from Cordele, Ga., southwest to Pensacola, Fla., 225 miles. (Mar. 16, 1906.)

ALBANY, CAIRO & GULF.—Projected from Albany, Ga., to St. Joseph's Bay, Fla., about 175 miles. W. B. Roddenberry, W. A. Walker, W. S. Wight, W. C. Jones, J. P. Malloy, O. T. Davis, M. L. Ledford, J. M. Sasser, S. W. Smith, L. E. Welch, S. Farkas, R. L. Hall and W. H. Hall, of Newton, incorporators; office at Cairo, Ga.

ALLENTOWN, TAMAQUA & ASHLAND.—See Keystone Air Line.

*ALTON, JACKSONVILLE & PEORIA (Electric).—Organized to build from Alton, Ill., to Jacksonville, with branch lines, 70 miles. Contract let to Melville Bros. to build from Alton to Godfrey, 60 miles; track laid for two miles. W. R. Heagler, Alton and Jerseyville, Ill., Chief Engineer.

ALTOONA & LOGAN VALLEY (Electric).—Projected extension from Hollidaysburg, Pa., to Frankstown; also a number of extensions in Altoona.

AMADOR RAILROAD.—To build from Martell, Cal., to Bartons, 21 miles. T. N. Harvey, Oakland; L. A. Berger and T. Hahns, San Francisco; C. B. Mills, J. L. Scotchler, J. C. Sullivan and J. B. Peck, Berkeley, incorporators.

AMARILLO & SOUTHERN.—Proposed line from Coleman, Tex., via Abilene, northeast 75 miles.

AMERICAN ASIATIC.—See Washington-Alaska Transportation Co.

AMERICAN ELECTRIC. — To be built from Davenport, Iowa, west across Iowa to Council Bluffs, 260 miles air line.

*AMERICAN-MEXICAN PACIFIC.—Contracts let to C. Bradbury & Co., of Denver, Colo., to build the first section of this proposed line from Phoenix, Ariz., southeast to Naco, 250 miles. Lyman Bridges, President and Chief Engineer, Tucson, Ariz.

*AMERICAN RAILROAD OF PORTO RICO.—Building an extension from Ponce to Coamo, 19 miles; also from Ponce to Barancas, four miles. Address George Servajeau, Isabela, Porto Rico.

ANDERSON & SALINE RIVER.—Surveys being made for an extension from Grant Spur, Ark., to Leola, seven miles. Robert York, Treasurer and General Manager, Pine Bluff, Ark.

*ANDERSON TRACTION.—Building from Anderson, S. C., to Belton, 10 miles. Projected to Greenville, S. C., 25 miles. J. A. Brock, of Anderson, President.

ANNISTON & COLUMBUS.—Organized to build from Anniston, Ala., southeast to Columbus, Ga., 110 miles. W. H. Wetherlee, Anniston, President.

*APALACHICOLA NORTHERN.—Contracts let to the Morey Engineering & Construction Co., of St. Louis, for building 59 miles between River Junction, Fla., and Apalachicola. Grading completed from Apalachicola to St. Joseph's Bay, 19 miles. Wm. A. Hunick, Chief Engineer of the construction company.

APPOMATTOX & CHARLOTTE.—Proposed line from Drake's Branch, Va., northwest to West Appomattox, 40 miles. E. B. Eggleston, Charlotte Court House, Va., is interested.

ARIZONA & CALIFORNIA.—See Atchison, Topeka & Santa Fe.

ARIZONA & MIDLAND.—The Lake Superior & Arizona Mining Co., of Arizona, has organized this company to build a railroad to connect mines at Superior, Ariz., with the Gila Valley, Globe & Northern, 28 miles. J. D. Cuddihy and A. W. Kerr, of Calumet, Mich., and H. L. Baer, of Hancock, Mich., are interested.

ARKANSAS, ANTHRACITE & WESTERN.—Organized to build from Fort Smith, Ark., east to Prairie View, 65 miles. The Arkansas-Anthracite Co. is interested. R. M. Rommel, C. McKee, G. Heim, directors.

*ARKANSAS CENTRAL.—Work to be begun soon by C. C. Godman on an extension from Paris, Ark., to Dardanelle, 48½ miles.

ARKANSAS, LOUISIANA & GULF.—Permanent location made from Pine Bluff, Ark., south to Monroe, La., 150 miles. E. G. Hammock, Monticello, Ark.

*ARKANSAS, OKLAHOMA & WESTERN (Formerly Rogers Southwestern).—Contracts let to the W. R. Felker Construction Co., Rogers, Ark., for extension from Springtown, Ark., to Siloam Springs, 10 miles.

ARKANSAS PACIFIC.—Proposed line from Mangum, Okla., to Memphis, Tenn., 635 miles. Surveys partly completed. Some contracts to be let about May 1. The South Side Coal & Railway Co.'s line, projected from Paris, Ark., east to Dardanelle, 38 miles, to form part of the main line. George D. Locke, President, Missouri Trust Building, St. Louis, Mo.

ARKANSAS VALLEY.—See Atchison, Topeka & Santa Fe.

ARKANSAS VALLEY & WESTERN.—See St. Louis & San Francisco.

ASHLAND & WESTERN.—Proposed extension from Ashland, Ohio, north to Vermilion, 50 miles, and south from Custaloga to Marietta, 100 miles.

*ASHEVILLE & CRAGGY MOUNTAIN.—Building from Craggy Mountain, N. C., to Democrat, 17 miles; three miles completed. The R. H. Tingley Co., New York, are the engineers. (Mar. 16, 1906.)

ASHEVILLE SOUTHERN.—See Southern.

ASTORIA & COLUMBIA RIVER.—Surveys made for an extension from Cartwright, Ore., south to Tillamook, 45 miles.

*ATCHISON, TOPEKA & SANTA FE.—The Eastern Railway of Oklahoma, the cut-off from Belen, N. Mex., east to Texico, 250 miles, is all built except 30 miles, which is nearly completed. The Lantry-Sharpe Contracting Co., of Kansas City, has the contract.
——*Contracts let to Thomas Mishon & Co., of Pueblo, Colo., and to William C. Whitescarver, of Trinidad, Colo., for extending the Arkansas Valley from Bristol, Colo., to Lays Junction, 17½ miles, and from Bent to Columbine, 41 miles.
——*Contracts let to the Brant Brothers Construction Company, Los Angeles, Cal., for a 27-mile extension of the Arizona & California in Arizona from mile post 80 to mile post 107.
——*The Denver, Kansas & Gulf, a part of the Denver, Enid & Gulf, is being extended from Sun City, Kan., to Belvidere, 10 miles. Kansas Construction Company of Medicine Lodge, Kan., contractors.
——A connecting line is to be built between Texico, N. Mex. (the eastern end of the Belen cut-off connecting with the Pacific lines), and Brownwood, Tex., about 300 miles, to connect with the Texas lines.
——*Contracts reported let to A. H. Moore, of Newton, Kan., for work on the Western Oklahoma from the main line at Alston, Okla., southeast to Seiling, 32 miles; grading under way. The company has also projected two other lines in Oklahoma.
——Proposed new double-track tunnel through Raton Mountain, near Raton, N. Mex. To be 5,000 ft. long, through solid rock, 144 ft. below the existing tunnel. (Mar. 16, 1906.)
——See Northwestern Pacific under Southern Pacific.

ATHENS, FLORAL PARK & NEWNAN AIR LINE.—Organized to build from Athens, Ga., southwest to Newnan, 70 miles. Ranson Rogers, 828 Empire building, Atlanta, Ga. (Mar. 16, 1906.)

ATHENS TERMINAL.—Organized to build a two-mile spur track from Athens, Ga., to the Seaboard Air Line. W. W. Mackall, T. M. Cunningham, C. B. Epps and W. B. Davis, incorporators.

ATLANTA & NEW ORLEANS.—Organized to build from Atlanta, Ga., to Baton Rouge and New Orleans, La. Office at Atlanta. Ronald Ranson, H. S. Collinsworth, F. M. Merkell, W. N. Hawkes, F. M. Butt and J. S. Middletown are interested.

*ATLANTA & ST. ANDREWS BAY.—Extension from Cottondale, Fla., south to Panama City, 54 miles, under construction; five miles built.
——Extension from Dothan, Ala., north to Opelika, 90 miles, and eventually to Atlanta, Ga.; projected.

ATLANTA & CAROLINA (Electric).—Organized to build from Atlanta, Ga., northeast to Commerce, and from Atlanta southwest to West Point, in all 170 miles. L. F. Sell, of Jackson; T. J. Clarke, W. E. Woods and R. W. Tucker, incorporators.

*ATLANTA, BIRMINGHAM & ATLANTIC.—Contracts let for building from La Grange, Ga., west to Birmingham, Ala., 165 miles, also from Chalybeate, Ala., northwest to Atlanta, 77 miles, to C. D. Smith & Co., of Memphis, Tenn.; the Callahan Construction Co., of Knoxville, Tenn., and Wright, Williams & Wadley, of Roanoke, Ala.
——Gates City Terminal, incorporated to build terminals in Atlanta, Ga.

ATLANTA, GRIFFIN & MACON.—Surveys made for proposed line from Atlanta, Ga., to Macon, 90 miles. Surveys under way from Macon south to Albany, 100 miles. This part of the work is to be carried out by the Interurban Construction Co. W. J. Kincaid, of Griffin, Ga., is President.

ATLANTIC & NORTH CAROLINA.—See Norfolk & Southern.

ATLANTIC COAST LINE.—Extension from Newberry, Fla., northwest about 75 miles to Perry; 20 miles built.
——*Building new freight yards at Waycross, Ga., to extend about a mile beyond the present yards, and to contain 15 miles of track.
——Branch from Washington, N. C., south to Newbern, 40 miles. Proposed. (Mar. 16, 1906.)

ATLANTIC & WESTERN.—Projected line from Broadway, N. C., east to Lillington, 15 miles. H. P. Edwards, Superintendent, Sanford, N. C.

ATLANTIC, NORTHERN & SOUTHERN.—Incorporated to build railroads in Iowa. J. H. Simmons, President; F. M. Nebe, Vice-President; Joseph Stier, Secretary, and E. Marquis, Treasurer, Atlantic, Iowa.

ARKANSAS, RED RIVER & PARIS.—Organized to build from Morris Ferry, Ark., east to Harris Ferry, on the Red river, 38 miles. T. S. Brown and W. S. Pryor, of Kansas City; F. A. Locke, W. C. Martin and W. E. Kinsworthy, of Ashdown, Ark., incorporators.

AUGUSTA & ELBERTON.—Projected from Augusta, Ga., to Elberton, 60 miles. F. E. Verdery, of Augusta, Ga., President. (Mar. 16, 1906.)

AUGUSTA & FLORIDA.—See Georgia & Florida.

AUGUSTA & LOUISVILLE.—Incorporated to build from Louisville, Ga., east to a point on the Augusta & Florida, about eight miles. J. C. Stone, R. M. Murphee, M. D. Jones and A. W. Jones, of Midville, Ga., and R. J. Piele, of Vidette, Ga., incorporators.

AUGUSTA & NORTHWESTERN.—Organized to build from Augusta, Ga., northwest to Athens, 100 miles. W. W. Ramsey, T. Fargo, B. Law-

rence and B. D. Langdon, of Augusta, incorporators.

AUSTIN & GOLDFIELD.—Proposed line from Austin, Nev., to Tonopah and Goldfield, via Manhattan, promoted by Philadelphia capitalists who backed the Tonopah & Goldfield.

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BALTIMORE & OHIO.—Plans for a freight line to be built under the charter of the Patapsco & Susquehanna, around Baltimore, are held in abeyance awaiting a court decision. Route is from Gorsuch station in Carroll County, through Carroll and Baltimore Counties, to the Western Maryland, east of Pikesville; thence under the Reisterstown turnpike by means of a tunnel; thence crossing the Northern Central near Rider station, passing north of Towsontown to a crossing of the Maryland & Pennsylvania near Oakleigh; thence to a connection with the Philadelphia division east of Baltimore at or near Sewall. The line will be about 40 miles long. Most of the grades will be 3/10 per cent. and the maximum 5/10 per cent.
——*Building classification yard at Brunswick, Md.
——*Laying third and fourth tracks between McKeesport, Pa., and Wheeling Junction.
——*Laying double track from Sterling, Ohio, to Nova, 25½ miles.
——Preliminary survey for new line from Johnstown, Pa., to Somerset.

*BALTIMORE, FREDERICK & HAGERSTOWN (Electric).—Organized to build from Baltimore, Md., to Hagerstown, 78 miles. Contracts let to Westinghouse, Church, Kerr & Co., of New York, for building 26 miles. J. E. Ingram, Jr., Baltimore, President; J. R. McSherry, Vice-President; T. R. Howard, Treasurer, and H. Coblentz, Secretary, all of Frederick, Md.

BALTIMORE TERMINAL CO.—See Washington, Baltimore & Annapolis.

*BANGOR & AROOSTOOK.—Contract let to A. E. Trites to lay second track on Seaport division, between Northern Maine Junction and Legrange, 30 miles.
——*Contract let to A. E. Trites to build a cut-off between Legrange and a point four miles south of West Sebois, on the main line, about 28 miles.

BATON ROUGE, HAMMOND & EASTERN.—Organized to build from Baton Rouge, La., east to Nicholson, thence northeast to Merrill, Miss. S. O. L. Wexler, President. Office at Baton Rouge.

BATTLE CREEK & SOUTHEASTERN.—Incorporated to build from Battle Creek, Mich., south to Coldwater, 30 miles. Address Scott Webb, Columbus, Ohio.

BAY CITY & PORT HURON.—Proposed line from Bay City, Mich., to Port Huron, 105 miles; 20 miles of grade completed from Port Huron to Lexington. W. C. Penoyar, Bay City, President. (Mar. 16, 1906.)

*BAYFIELD, LAKE SHORE & WESTERN.—Contract let to W. H. Johnson, of Superior, Wis., to build from Bayfield, Wis., to Cornucopia, seven miles. The road is projected to Superior, 75 miles from Bayfield. (Mar. 16, 1906.)

BAY MINETTE & FORT MORGAN.—See Louisville & Nashville.

BAY POINT & CLAYTON.—Incorporated in California, with office at San Francisco, to build railroads. H. E. Cowell, S. P. Cowell and W. H. George, Directors.

BAY SHORE & PACIFIC.—Incorporated in California, to build from the southern boundary of San Diego to Pacific Beach and La Jolla; to be the first portion of a proposed railroad to Imperial (about 60 miles east of San Diego). H. T. Richards, C. R. Hammond, William Crouse, S. Connell, I. D. Stewart and H. C. Oatman, of San Diego, and N. H. Rodgers, of Denver, Directors. (Mar. 16, 1906.)

BAY SHORE.—See Southern Pacific.

*BEAUMONT & GREAT NORTHERN.—Under construction from Onalaska, Tex., southeast to Livingston, 15 miles.

*BEAUMONT & SARATOGA TRANSPORTATION.—Building with its own forces a three-mile extension from Sour Lake Junction, Tex., to Pelt; also a branch from Sour Lake Junction to a connection with the Beaumont, Sour Lake & Western, three miles; a further extension projected from Pelt to Saratoga, 11 miles. J. H. Broome, Voth, Tex.

BEAUMONT, SOUR LAKE & WESTERN.—See Colorado Southern, New Orleans & Pacific.

BEAVER CREEK.—Organized to build up Beaver Creek in Floyd County, Ky., 33 miles. Surveys completed. Office at Pikeville, Ky.

BEAVERTON & WILLSBURG.—See Southern Pacific.

BERING, KIAM & SOUTHERN.—Incorporated to build from Bering, Tex., southeast to Kiam, 15 miles. Conrad Bering, of Houston, and J. E. Hill, of Lexington, are incorporators.

BESSEMER & LAKE ERIE.—Double tracking to be finished at a cost of $1,000,000 between Conneaut and Bessemer.

BIG CREEK & TRINITY VALLEY.—Organized to build from Big Creek, Tex., to Egypt, 10 miles. J. H. Steele, Galveston; S. T. Swinford and B. D. Brown, of Houston, Incorporators.

BIG STONY.—See Norfolk & Western.

BILLINGS & NORTHERN.—See Great Northern.

*BIRMINGHAM & LINEVILLE.—Six miles of grading completed between Lineville, Ala., and Pyritor 10 miles. Contracts for the remaining four miles let. (Mar. 16, 1906.)

BIRMINGHAM & MISSISSIPPI SOUTHERN.—Incorporated to build from Baton Rouge, La., northeast to Birmingham, Ala., about 250 miles, and a branch from Waynesboro, Miss., south to Scranton, 100 miles. Preliminary surveys made. William A. Aaron, of Hattiesburg, Miss., interested.

BIRMINGHAM & SOUTHWESTERN.—Organized in Mississippi to build from Birmingham, Ala., via Hattiesburg, Miss., to Baton Rouge, La. Incorporators include former Governor A. H. Longino, former Secretary of State J. J. Coleman, A. J. Hackett, of Jackson, Miss.; G. G. Gibson, of Birmingham; J. C. Dunlap, of Chicago; R. C. Oliver, of Hattiesburg, and E. F. Ballard, of Waynesboro, Miss. (Mar. 16, 1906.)

*BIRMINGHAM, COLUMBUS & ST. ANDREWS BAY.—Contracts let to Lemuel E. Miller, Philadelphia, for building from Warsaw, Fla., to St. Andrews Bay, 38 miles.
——Surveys for an extension from northern terminus at Chipley, Fla., to Columbus, Ga., 150 miles. W. M. Gordon, President, Columbus, Ga.

*BIRMINGHAM SOUTHERN.—The Tennessee Coal, Iron & Railway Company is reported to have given a contract for building a five-mile extension of this road to reach new mines near Pratt City, Ala.

*BLACK LICK & YELLOW CREEK.—Building from Rexis, Pa., to Burns Summit, 10 miles. A. W. Lee, Clearville, Pa., President.

*BLACK MOUNTAIN.—Contracts let to Callahan Construction Company, of Knoxville, Tenn., for building from Pennington Junction, Va., to Imboden, 17½ miles; also for spurs to coal mines, 5½ miles. E. S. Fraser, Chief Engineer, Bristol, Tenn.

BLOOMINGTON BELT TRACTION (Electric).—Incorporated with office at Bloomington, Ill., to build from Bloomington to Champaign, to form part of the McKinley-Syndicate lines. W. B. McKinley, Champaign, Ill.; Peter W. Moore, L. B. Thomas, E. D. Riddle and H. C. Larch, Directors.

BLUE RIDGE & ATLANTIC.—See Tallulah Falls.

BONNERVILLE & SOUTHWESTERN.—See St. Louis & San Francisco.

BOSTON & ALBANY.—See New York Central & Hudson River.

BOSTON & MAINE.—The line from Johnsonville, N. Y., southwest to Troy, 16 miles, is to be double tracked.

BOSTON & NEW YORK (Electric).—Organized to build from Forest Hills, Mass., to the Rhode Island state line, 30 miles. A. B. Leach & Co., New York, are said to be interested.

*BOSTON ELEVATED.—The work on the Washington street tunnel, Boston, now under construction, will be completed in about one year. On the completion of this tunnel it is to be operated by the Boston Elevated.
——Two subways to be built into Cambridge, one through Massachusetts avenue to Harvard Square, and the other through Cambridge street and East Cambridge, to Harvard Square, each connecting with subway into Boston.

BOSTON, LOWELL & LAWRENCE (Electric).—Organized to build from Boston, Mass., northwest to Lowell, 28 miles. Butler Ames, Paul Butler, Spencer Borden, Jr., Oakes Ames and Charles F. Remington, of Boston, Directors.

BOSTON TRANSPORTATION COMPANY.—Organized to build 10 miles of deep freight tunnels under the city of Boston, Mass. These tunnels would run to the North and the South stations, the docks, and the wholesale districts.

BOWLING GREEN & WESTERN.—Incorporated to build from Bowling Green, Ky., to Horsebranch. Surveys. J. T. Sweeney, A. H. Taylor, of Bowling Green; W. A. Helm and J. M. Carson, of Morgantown, Ky., Directors.

BOYNE CITY, GAYLORD & ALPENA.—Incorporated to build from Boyne City, Mich., east to Alpena, 100 miles; 27 miles in operation.

BRANDON & LAUREL.—Preliminary surveys from Brandon, Miss., southeast to Laurel, 65 miles. Office at Brandon.

BRINSON RAILWAY.—Incorporated to build from Savannah, Ga., northwest to Athens, 180 miles. Office at Savannah. George M. Brinson, Charles Neville, Y. E. Bergeron, W. A. Beale, W. C. Myers, C. H. Mason, J. H. Dazemore, H. W. DeLoach, E. F. Rogers, and W. L. Clarke, incorporators.

*BROOKLYN RAPID TRANSIT.—Work under way changing the tracks of the Long Island Railroad and of the Brighton Beach branch of the Brooklyn Rapid Transit Co., in the Borough of Brooklyn, N. Y. The Brooklyn Grade Crossing Commission has the improvements in charge, under a special law. To be completed by May, 1907. The plans call for a cut from 18 ft. to 20 ft. deep on the Manhattan division of the Long Island from Manhattan Junction to Bay Ridge, where there will be a large depressed freight terminal.
——The Suffolk Traction Co., incorporated last July to build from Brookhaven, Long Island, to Babylon, 28 miles.

BROOKVILLE & MAHONING.—See Pittsburg, Shawmut & Northern.

BROWNSVILLE, HIDALGO & NORTHERN.—Contracts soon to be let for building from Brazos Island, Tex., west via Brownsville to Hidalgo, 84 miles, and Corpus Christi. Surveys completed and nearly all the right of way secured. Urian Lott is President; James A. Browne, Vice-President, and John D. Hill, Secretary, Brownsville.

BROWNSVILLE, MASONTOWN & SMITHFIELD (Electric).—Surveyed from Masontown, Pa., west to Riverview; also from Masontown north to Brownsville, and from Masontown to New Geneva, a total of 15 miles. W. J. Sheldon, of McKeesport, Pa., President.

BROWNWOOD, WACO & NORTHERN.—Proposed line from Rising Star, Eastland County, Tex., south to Brownwood, 30 miles, thence east to Waco, 125 miles. Address Brooke, Smith & Co., of Brownwood. (Mar. 16, 1906.)

BROXTON AIR LINE.—Organized to build from Broxton, Ga., to Helena, 30 miles. Contracts soon to be let. W. R. Frier, Broxton, Ga., President.

BROXTON, HAZELHURST & SAVANNAH.—Organized to build from Osierfield, Ga., east to Savannah, 130 miles. J. A. J. Henderson, W. N. Smith, J. A. Pruitt and J. D. Paulk, of Ocilla, Ga., incorporators. (Mar. 16, 1906.)

BRUSH CREEK & CROW'S RUN.—See Keystone Air Line.

BUCK CREEK & CATAWBA RIVER.—Chartered to build from a point in McDowell County, N. C., near the mouth of Buck Creek, down the valley of the Catawba river to the North Toe river at a point where it crosses the Tennessee state line, about 100 miles. C. Boice, of Abingdon, Va.; G. W. Edwards, of Winston-Salem; J. Crawford Biggs, of Durham; L. D. Heart, W. B. Jones and S. J. Hinsdale, of Raleigh, are interested. (Mar. 16, 1906.)

BUCKHANNON & NORTHERN.—Projected line from Bellington, W. Va., north to New Brownsville, Monongahela County, 60 miles. About 30 miles graded, but work suspended. S. D. Brady, Parkersburg, W. Va., Chief Engineer. (Mar. 16, 1906.)

BUFFALO & SUSQUEHANNA.—Plans for rebuilding the road from Juneau, south toward Pittsburg and for building new yards made. Bids may shortly be asked for.
——Reported that the right of way and surveys of the proposed Pittsburg & Northeastern, projected from Pittsburg, Pa., northeast to South Bend, in Armstrong County, 40 miles, are to be acquired for a Pittsburg entrance.
——*Building large yards near South Bend, Pa.
—— Surveys made from Sagamore to South Bend.
——Will build a tunnel one mile long between Corbett, Pa., and Hull, and one near Newfield. Work to begin March, 1907.

*BUFFALO CREEK & GAULEY.—Contracts let to J. B. Tully, Sutton, W. Va., for building from Gulf, W. Va., to Rockcamp, two miles. Additional contracts soon to be let for building from Rockcamp to Camden, 29 miles. N. D. Janney, Chief Engineer, Clay Courthouse, W. Va.

BUFFALO CREEK EXTENSION.—Incorporated to build from Buffalo, N. Y., to Gardenville, Erie County, with a branch to the Lehigh Valley in Buffalo, eight miles. F. D. Underwood, President, and George F. Brownell, Vice-President.

BUFFALO, LAKE ERIE & NIAGARA.—Organized to build a connecting railroad around the city of Buffalo, N. Y., to Tonawanda, 37½ miles. Edward Michael, 618 Mooney Building, Buffalo, President, and C. C. Conkling, 798 Ellicott avenue, Chief Engineer.

*BUFFALO, LOCKPORT & ROCHESTER (Electric.)—Work under way on 54 miles of road from Rochester west to Lockport. Contract let to J. G. White & Co., New York. From Lockport the company expects to use the tracks of the International Traction Company into Buffalo. The project is financed by the Transit Finance Co., of New York, and the Mackenzie & Mann syndicate, of Toronto.

BUFFALO, ROCHESTER & PITTSBURG.—Surveys reported for an extension from Iselin, Pa., southwest to Pittsburg.
——Plans reported under way to complete the double track from Punxsutawney, Pa., to Rochester, N. Y. There remain about 11 miles to be done from Brockwayville, Pa., north to Carmen.
——Branch projected from near Juneau, Pa., to Rossiter, to develop new coal mines; also several spur mines in South Indiana County.

BUFFALO UNION TERMINAL.—Incorporated to build a steam railroad seven miles long in Buffalo, N. Y. F. C. Mosedale, C. A. Collins and Bernard Marron, all of Buffalo, Directors. (Mar. 16, 1906.)

*BURRS FERRY, BROWNDEL & CHESTER.—Contract let to Womack Construction Co. for extension from two miles east of Aldridge, Tex., east to Browndel, 25 miles.

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*CACHE VALLEY.—Contracts let to the Culver Construction Company of Sedgwick, Ark., for extension from Walnut Ridge, Ark., east to Paragould, 28 miles.
——Projected line from Newport, Ark., southeast to the state line, 80 miles.

CAIRO & KANAWHA VALLEY.—Proposed extension from Macfarlane, W. Va., south, 10 miles, to the Little Kanawha river.

CAIRO & TENNESSEE.—See Powell's Montana Mineral.

*CAIRO & THEBES.—Incorporated to build from Cairo northwest to Thebes, 25 miles. Surveys completed for nine miles from Cairo. Part of the work let to the Cairo Construction & Dredging Co. J. B. Magee, President; E. A. Smith and J. H. Galligan, of Cairo, incorporators.

CAIRO, MAYFIELD & NASHVILLE.—See Nashville, Chattanooga & St. Louis.

CALIENTE & PIOCHE.—See San Pedro, Los Angeles & Salt Lake.

CALIFORNIA & OREGON COAST.—Proposed

line from Grant's Pass, Ore., southwest to Takilma, 45 miles. J. O'B. Gunn, Mechanics Savings Bank, President, and J. W. M. Draper, Chief Engineer, San Francisco, Cal.

CALIFORNIA NORTHEASTERN.—See Southern Pacific.

CALIFORNIA ROADS.—Reported that the Great Western Gold Co. plans to build from Redding, Cal., to the Ingot Smelter, 26 miles.

CALUMET, HAMMOND & SOUTHEASTERN.—Incorporated to build from Chicago, Ill., east of Lake Calumet to the Illinois-Indiana state line, with a branch to Lake Michigan. Talbot E. Pierce, Chicago, incorporator.

CAMDEN SOUTHERN.—Proposed line from Hillsdale County, Mich., to Coldwater, 32 miles. John Reck, Hillsdale, Mich., President. (Mar. 16, 1906.)

CANADIAN MIDLAND.—Incorporated to build from Kansas City, Mo., to El Paso, Tex. Office at Lawton, Okla. G. R. Robertson, C. F. H. Barber, G. McPaschal, Lawton; Milfred Steele, Chicago; I. B. Hampton, Hampton, Ind.; A. S. McKennon, Wekota, Ind. T., and E. A. Hill, Muskogee, incorporators. (Mar. 16, 1906.)

CANADIAN NORTHERN.—See under Canada.

CANADIAN RIVER.—See Santa Fe, Liberal & Englewood.

*CANTON & YOUNGSTOWN (Electric). — Contract let to Collins Construction Co., Chicago, for line from the cities of Canton, Ohio, to Youngstown, with branch from point north of Congress Lake to Akron, in all 65 miles.

CANYON CITY & ROYAL GORGE (Electric).—To build from Canyon City, Colo., through Royal Gorge, 11 miles. Successor of Canyon City, Florence & Royal Gorge Interurban. F. D. Heath, D. E. Gibson, James H. Peabody, W. H. Peabody and E. M. Smith, of Canyon City; W. W. Umberhauer and T. J. Budd, Philadelphia; W. Wood and W. Hutty, of Kansas City, Directors.

CAPE CHARLES.—Incorporated in Virginia to build a line 15 miles long. William A. Patton, Radnor, Pa., President.

CARLINVILLE, ALTON & ST. LOUIS.—Organized to build from Carlinville, Ill., southwest to Jerseyville, thence south to Alton, 50 miles. Headquarters in Jerseyville. Andrew J. Gross, J. M. Page, J. W. Becker, J. C. McGrath, Jerseyville; A. L. Austen, Chicago; Robert Curdle, Alton, Directors. J. M. Rhoades, Sec'y, Jerseyville. (Mar. 16, 1906.)

CAROLINA, GLEN ANNA & PEE DEE.—Proposed line from Winston-Salem, N. C., to Rockingham, 110 miles; 21 miles built. L. V. Edwards, Chief Engineer, Highpoint, N. C.

*CAROLINA MINERAL. — Incorporated by the Colosses Gold Mining & Milling Co., of Waxhaw, N. C., to build from the Colosses Mine north to Charlotte, N. C.; also south to Lancaster, S. C. Track-laying under way. J. F. Keller, Lancaster, Pa., President; A. J. Moore, Waxhaw, N. C., Chief Engineer.

CARO NORTHERN.—To build from Caro, Tex., north to Mount Enterprise, a new town in Rusk County. M. W. Jones and C. H. Morris, Winnesboro; W. T. March and W. G. Ross, Mount Enterprise, and W. W. Whiteman, Ardmore, Ind. Ter., incorporators.

CARROLLTON SHORT LINE.—See Alabama, Tennessee & Northern.

CEDAR CREEK.—Chartered to build six miles in Fayette and Westmoreland Counties, Pennsylvania. Charles Marshall Johnston, Pittsburg, President. (Mar. 16, 1906.)

CENTRAL & SOUTHEASTERN.—Projected line from Chanute, Kan., to Memphis, Tenn., 425 miles, and from the smelters at Chanute to zinc mines in southwest Missouri. Surveys made from Chanute to the Missouri-Arkansas state line. Rights of way secured in Kansas. Ten miles graded. A. N. Hoxie, President, Joplin, Mo.; F. S. Hoxie, Secretary, 273 Fifth Avenue, New York.

CENTRAL CALIFORNIA.—See Southern Pacific.

*CENTRAL CALIFORNIA TRACTION.—Building from Stockton, Cal., north to Sacramento, 50 miles. Contract let to Moring Bros., of Stockton, to build from Stockton to Lodi, 16 miles. Four miles of track laid. Extension projected from Stockton southeast to Modesto, 45 miles. R. S. Masson, Stockton, Chief Engineer.

CENTRAL ILLINOIS.—Chartered to build from Roodhouse, Ill., east to Paris, 145 miles. A. S. Somerville and J. Devine, Chicago, incorporators. (Mar. 16, 1906.)

CENTRAL OF LOUISIANA.—See Kansas City Southern.

*CENTRAL OF OREGON.—Contracts let for an extension from Union, Ore., northwest to La Grande, 45 miles. A. B. Brown, Union, Ore., Chief Engineer.

CHANDLER & OKMULGEE.—Organized to build from Chandler, Okla. Ter., east to Okmulgee, Ind. T., 60 miles. Office at Chandler. Lee Patterson, Strand; H. B. Gilstrap, G. B. Rittenhouse and M. D. Owen, Chandler, incorporators. Surveys made.

*CHARLESTON & SUMMERVILLE (Electric).—Contract let to D. E. Baxter & Co., New York, to build from Charleston, S. C., northwest to Summerville, 27 miles. Ogden Edwards, President, Troy, Ohio.

CHARLESTON, PARKERSBURG & WESTERN.—Chartered to build from Charleston, W. Va., to Parkersburg, 60 miles. Located for eight miles. A. S. Alexander, President, and C. P. Peyton, Chief Engineer, Charleston, W. Va. (Mar. 16, 1906.)

CHARLESTON, VIRGINIA & OHIO RIVER.—Chartered to build from Charleston, S. C., to Norton, Va., 350 miles. Headquarters at Morganton, N. C. W. C. Ervin, H. L. Millner, E. P. Tate, of Morganton, and W. T. Hunter, Joseph F. Gowan and Robert X. Regney, of New York, incorporators.

*CHARLOTTE HARBOR & NORTHERN.—Building extension from Gasparilla, Fla., to Peace River, 29 miles. Surveys from Arcadia to Plant City, 65 miles. Address L. Fouts, 316 Duval Building, Jacksonville, Fla.

CHARTIERS SOUTHERN. — See Pennsylvania Lines West.

CHATTAHOOCHEE VALLEY.—Projected line from West Point, Ga., to a point in Carroll County, 50 miles; 17 miles in operation.

*CHATTANOOGA & MONTLAKE.—Building in Tennessee from the mines of the Montlake Coal Co., near Daisy, to Chattanooga, 20 miles; also branch to the Tennessee river, 7 miles. G. W. Nixon is President of the Montlake Coal Co. (Mar. 16, 1906.)

CHATTANOOGA NORTHERN.—Incorporated to build from Chattanooga, Tenn., to Walden's Ridge, 20 miles. The Chattanooga Company, Ltd., of which W. G. M. Thomas, of Chattanooga, is General Manager, said to be interested.

*CHERRYVALE, OKLAHOMA & TEXAS.—Contracts let to the Stubbs Construction Co., Kansas City, to build 215 miles from Caney, Kan., southwest to Kingfisher, Okla. Projected from Caney, Kan., to El Paso, Tex., 900 miles. S. M. Porter, Caney, Kan., President.

CHESAPEAKE & OHIO.—Extension of the Potts Creek branch, 25 miles, authorized.

*CHESTERFIELD & LANCASTER.—Contracts let to E. H. Page & Son for extension from Pageland, S. C., to Lynches River, three miles. A. H. Page, Cheraw, S. C., Secretary and Treasurer.

CHEWAHWAH VALLEY.—Incorporated to build 30 miles in Chelan County, Wash. Will let contracts about April 1. H. F. Albers, 82 Beaver street, New York, is interested.

*CHICAGO & EASTERN ILLINOIS.—Double-tracking 52 miles from Tuscola, Ill., southwest to Pana under way.
——Surveys reported from Joppa, Ill., south to Jackson, Tenn.
——Surveys made for proposed extension from Salem, Ill., northwest to Springfield, about 90 miles. (Mar. 16, 1906.)

CHICAGO & ILLINOIS WESTERN.—Surveys made and rights of way secured for an extension from Willow Springs, Ill., southwest to Joliet, 37 miles.

CHICAGO & NORTHERN INDIANA. (Electric).—Proposed line from Logansport, Ind., to Russlaville. Grading contracts to be let this month. Lester Soule, Indianapolis, Ind., President.

CHICAGO & NORTH-WESTERN.—The Lee County Railway has been incorporated to build a low grade cut-off on the main line to Omaha from Nachusa, Ill., west to Nelson, 12 miles.
——*Contract let to M. J. Peppard, of Minneapolis, for a ten-mile extension east from the end of the Antigo (Wis.) branch; also for a 30-mile line north and a 30-mile line south from the end of the new extension.
——*Winston Bros. Co., of Minneapolis, has the general contract for the Pierre, Rapid City & North-Western from Pierre, S. Dak., west to Rapid City, 155 miles. Some of the work sublet to the Calhoun Construction Co., of Spearfish, S. Dak. The line has been completed from Fort Pierre west to Midland, 49 miles, and from Rapid City east to Owanka, 44 miles, both of which are now in operation.
——*The Pierre & Fort Pierre Bridge & Railway is building from the western terminus of the lines of the C. & N.-W. in Pierre over the Missouri river to the eastern terminus of the Rapid City & North-Western in Fort Pierre, three miles.
——*Contract let to Kilpatrick Bros. & Collins, of Omaha, for building 26 miles of an extension from Bonesteel, S. Dak., northwest to Burke; 12 miles built last year. The line is to be extended northwest from Burke, crossing the Pierre-Rapid City line at Midland.
——See Sioux City, Pierre & North-Western.

*CHICAGO & WABASH VALLEY.—Building an extension from Dunwiddie, Ind., to Gary, 20 miles. Surveys under way from Dunwiddie to Crown Point.

*CHICAGO, ANAMOSA & NORTHERN.—Building from Anamosa, Iowa, to Waterloo, 73 miles; 20 miles completed. Henry Kiene, Dubuque, Iowa, President, and J. F. Lacord, Anamosa, Iowa, Chief Engineer.

CHICAGO, BLOOMINGTON & DECATUR.—Organized to build through Will, Grundy, Livingston, McLean, Dewitt and Macon Counties, Ill., 120 miles. (Mar. 16, 1906.)

CHICAGO, BURLINGTON & QUINCY.—Maps filed for an extension of the Big Horn from Worland, Wyo., south to Thermopolis, 40 miles, thence along the Big Horn river.
——*Contracts let to the Kilpatrick Bros. & Collins Construction Co., of Beatrice, Neb., for new line to reduce grades from Lincoln, Neb., to Milford, 20 miles.
——Improvements to be made in freight facilities at St. Joseph, Mo.
——Surveys reported for extension of Sargent branch from Sargent, Neb., west to Anselmo, 30 miles.

*CHICAGO, INDIANAPOLIS & LOUISVILLE.—Connecting line being built under charter of the Indianapolis & Louisville, from Wallace Junction, on the main line one mile north of Quincy, Ind., southwest through Cataract, Jorden, Patricksburg, Clay City, Howesville and Midland to Victoria, on the Illinois Central just west of Linton, the terminus of a C., I. & L. branch, 47 miles. The Dickason Construction Company, contractors; 20 miles of track laid.

CHICAGO, IOWA & NORTHWESTERN.—Proposed line from Anamosa, Iowa, northwest to Austin, Minn., 160 miles. The Empire Railway Construction Co., incorporated with office at Waterloo, Iowa, to carry out this work. George E. Armstrong, Jr., William Bristol and G. H. Myers, of New York, interested in the construction company.

CHICAGO, JOLIET & KANSAS CITY.—Incorporated to build from Chicago, Ill., to Kansas City, 450 miles. Surveys reported made via Joliet, Peoria and Beardstown, crossing the Mississippi river at Quincy. J. C. Eden, President; B. F. Hardesty, Chief Engineer, and C. A. Denham, Construction Engineer, 608 Rector Building, Chicago.

*CHICAGO, LAKE SHORE & SOUTH BEND (Electric).—Contracts let to the South Bend Construction Co. for construction and equipment of this line from South Bend, Ind., to Kensington, within the city limits of Chicago. Track laid for 10 miles. J. B. Hanna, President, South Bend, Ind.

*CHICAGO, MILWAUKEE & ST. PAUL.—Rebuilding at various points its road between St. Paul and the Missouri river, and double-tracking the remaining 115 miles of the Chicago-St. Paul line.
——*Extension from Glenham, S. Dak., west via Butte, Mont., to Seattle, Wash., 1,500 miles, with a connecting line from the main line at Black River Junction south to Tacoma, 20 miles. There will be seven steel bridges aggregating 5,725 ft., with steel approaches 3,425 ft. long; 1,500 ft. of steel trestles over deep ravines; four tunnels with a total length of 15,630 ft., and later at Snoqualmie Pass a tunnel about two miles long. The line from Glenham to Butte is under contract to McIntosh Bros. of Milwaukee. The Bitter Root tunnel in Montana, and approaches for 2½ miles on each side, are being built by Nelson Bennett, of Tacoma, Wash. The line between the Bitter Root mountains and the coast is under contract to H. C. Henry, of Seattle. All steel bridges and trestles will be erected by the company's men. Grading is completed and track laid from Glenham to a point about 20 miles west of the Missouri river. Much grading has been done in the Yellowstone and Musselshell valleys, and sub-contracts have been let. It is expected that construction will be completed to Butte by January 1, 1908, and to the coast a year later.
——*The White River Valley building from Chamberlain, S. Dak., west to Rapid City, 219 miles; track laid for 136 miles; 75 miles in operation to Murdo Mackenzie.
——*Branch from Greene, Mich., southwest 12½ miles. Grading about half finished.
——See North Coast.

CHICAGO, NEW WASHINGTON & BUCYRUS (Electric).—Proposed electric line from Chicago, Ohio, through New Washington to Bucyrus. E. Z. Williams, Chicago, Ohio, President, and R. B. Seers, Bucyrus, Secretary and Treasurer.

*CHICAGO, ROCK ISLAND & PACIFIC.—The Rock Island, Arkansas & Louisiana is to be extended from the southern boundary of Winn Parish, La., to Eunice, on the projected Colorado Southern, New Orleans & Pacific, 90 miles. Contracts from Alexandria to Eunice, 56 miles, let to the Dalhoff Construction Company, of Little Rock, Ark.
——Surveys reported from a point near Watanga, Okla., northwest about 60 miles into Dewey County, north of the Canadian river.
——Plans reported for 39 miles of new yard tracks in the Kansas City terminals.
——Plans reported for an independent entrance into Denver, Colo., over a new 60-mile line to be built from Limon via Colorado Springs, and Resolis, thence northwest to Melvin, 10 miles southeast of Denver, from which point Colorado & Southern tracks are to be used into the city.
——The Roswell Construction Company has been organized to build from Roswell, N. Mex., to Tularosa, reported in the Rock Island interest. U. S. Bateman, J. A. Cottingham, G. T. Veal and H. W. Stevens, of Roswell, interested.
——See Colorado Southern, New Orleans & Pacific.

*CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—Contract reported let to Winston Bros., Minneapolis, Minn., for extension from Newcastle, Neb., to Wynot, 18 miles. Grading under way.

*CHICAGO, WEATHERFORD & BRAZOS VALLEY.—Contract let to the McCarthy-Miller Construction Co., of Lufkin, Tex., to build from Weatherford, Tex., to Bridgeport, 35 miles. Probable further extension south to Granbury or Glen Rose. (Mar. 16, 1906.)

CHOCTAW, NEWCASTLE & WESTERN.—Incorporated by J. R. Lebosquet, of Little Rock, Ark.; S. T. Pierson and W. P. Dix, of Shawnee, Ind. T. L. C. Rose and A. W. Underwood, of Chicago, to build from McAlester, Ind. T., west to Lawton, Okla., about 200 miles.

CIMARRON & NORTH WESTERN.—Incorporated with office at Raton, N. Mex., to build from Cimarron northwest to Van Bremmer Park, 36 miles. C. N. Blackwell, W. H. Decker and Albert A. Miller, incorporators.

CINCINNATI & BIRMINGHAM AIR LINE.—Surveys being made from Paintsville, Ky., south through Tennessee to Birmingham, Ala., 400 miles. J. H. Connor, President, Nashville, Tenn.

CINCINNATI & COLUMBUS TRACTION.—Proposed extension from Hillsboro, Ohio, north to Washington C. H., 30 miles.

CINCINNATI BELT (Electric).—Organized to build a double track belt line around Cincinnati, Ohio, to have 24 miles of track. J. G. Jacobs and O. C. Evans, Cincinnati, interested.

*CINCINNATI, BLUFFTON & CHICAGO.—Contracts let to the Ireland Construction Co. for an extension from Bluffton, Ind., northwest to Huntington, 23 miles.

CINCINNATI, COLUMBUS & TOLEDO.—Incorporated to build from Cincinnati, Ohio, to Toledo. H. H. Hoffman, Norwood, O., President.

*CINCINNATI, GEORGETOWN & PORTSMOUTH (Electric).—Contract let to Thomas Daulton, of West Union, Ohio, for extension from Russellville, Ohio, to West Union, 14 miles.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—The Kentucky & Southeastern is projected southeast through Breathitt, Perry, Knott and Letcher Counties, Ky., 70 miles.
——Surveys from Kismet, Morgan County, Tenn., southwest to South Pittsburg, 133 miles.

*CINCINNATI, TOLEDO & DETROIT SHORT LINE.—Has bought right of way for line from Toledo to Cincinnati. Contracts reported let.

CITIZENS' RAILWAY & LIGHT CO.—Incorporated by W. Bickwell, J. B. Nutt, of Cleveland, Ohio; W. O. Allen, of Fostoria, Ohio, and others, to build interurban lines radiating from Fort Worth, Tex.

CLAREMONT RAILROAD (Electric).—Incorporated to build from Jackson, Miss., west to Clinton, thence to Cooper's Well, 16 miles, and eventually to the Mississippi river, a total of 43 miles. R. K. Jayne and M. Culberson, of Jackson, and M. Walker, of Brandon, incorporators.

CLEAR LAKE & SOUTHERN.—Proposed line from San Francisco, Cal., north to Lakeport, 130 miles. Surveys. Address Le Grand Brown, 745 Monadnock Bldg., San Francisco.

CLEVELAND & SHARON TRACTION (Electric).—Organized at Sharon, Pa., to build from Sharon to Middlefield, Ohio. Francis B. Morgan, President, Cleveland, Ohio.

CLEVELAND, ALLIANCE & MAHONING VALLEY (Electric).—Organized to build from Cleveland, Ohio, through Ravenna to Alliance, with branch from Ravenna to Newton Falls. David Morrison, President; F. H. Townsend, Treasurer, and C. R. Morley, Secretary, Cleveland.

*CLEVELAND, ASHLAND & MANSFIELD.—Incorporated to build from Ashland, Ohio, southwest to Mansfield, 14 miles. Contract for grading is let to L. B. Stanley & Co., Collinwood, Ohio. Work under way. Office, Williamson Building, Cleveland, Ohio.

CLEVELAND, BROOKLYN & ELYRIA (Electric.)—Rights of way secured from Cleveland, Ohio, southwest to Elyria, 25 miles. J. J. Breitenger, President; B. E. Ottman, Treasurer, and J. H. Knieseley, Jr., Secretary, Cleveland.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Surveys under the charter of the Evansville, Mt. Carmel & Northern from Mt. Carmel, Ill., south to Evansville, Ind., 34½ miles.

*CLEVELAND SHORT LINE.—Building around Cleveland, Ohio, from Collinwood to Rockport, 18 miles. Three miles of track laid; five miles of grading completed. Contracts let to John Marsch, of Cleveland, and Dunn & Keith, for masonry work. Additional contracts soon to be let. M. A. Fanning, President, Cleveland, Ohio.

CLEVELAND, YOUNGSTOWN & EASTERN.—Incorporated as successor of the Eastern Ohio Traction Co. and to build from Chagrin Falls, Ohio, southeast to Garrettsville, 20 miles. Robert D. Beatty, General Manager, Schofield Building, Cleveland.

CLINTON, CHEYENNE & CANADIAN.—Incorporated to build from Clinton, Okla., west to Canadian, Hemphill County, Texas, 100 miles.

COAL & COKE.—Proposed extension from Gassaway, east up the Elk river beyond Sutton.
——Also a line from Gilmer, east of Gassaway, up the Little Kanawha, to Glenville, 11 miles.

*COAL RIVER.—Contracts let to Carpenter Bros., of Clifton Forge, Va., for extension from Lick Creek, Va., to Racine, seven miles, and from Cobbs to Seng Camp, 36 miles.

COAST LINE RAILWAY.—See Southern Pacific.

COFFEYVILLE & MEMPHIS.—Incorporated to build from Coffeyville, Kan., southeast through Oklahoma to a point in Crittenden County, Ark., on the Mississippi river, about 375 miles, with a 150-mile branch southwest to Shawnee, Okla. J. O. Hall, W. P. Brown, E. A. Rosser, P. H. Grahon, E. C. Kiddoo, George A. Gabbler, J. E. McClunry, A. J. Yoke and W. C. Hall, of Coffeyville; J. I. Lehman, of Centralia, Kan., and O. N. Selby, of Oklahoma City, incorporators.

COLLEGE CITY & SOUTHERN.—Incorporated to build from Kiowa, Kan., to Alva, Okla. Ter., 35 miles. Office at Alva. E. T. McKnight is President and General Manager, Alva. T. G. Woodward is First Vice-President, J. B. Kent, Second Vice-President; W. B. Taylor, Secretary, and J. B. Dullin, Treasurer.

COLORADO & NORTHERN.—Incorporated to build from a point near Hayden, Colo., north 20 miles, with a branch eventually to Hahns Peak, Colo., and to Encampment, Wyo.; also from Hayden southwest to Pallos. B. L. Dorsey, President; A. A. Johnson, Vice-President and General Manager, and M. E. Johnson, Secretary and Treasurer.

*COLORADO & SOUTHERN.—The Trinity & Brazos Valley is being extended from a point 32 miles north of Teague, Tex., north to Waxahachie, 35 miles.
——*The Abilene & Northern is being extended from Abilene one mile south. M. T. Reed, contractor. It is projected from Abilene, Tex., south to Brady, 85 miles.
——Galveston Terminal Co. will soon start work on extensive terminals in Galveston.
——Proposed line from Trinidad, Col., north to Florence, 120 miles.
——Surveys made to extend the Catskill branch from Martensen, Colo., west 50 miles.
——Proposed northern extension to the Yellowstone river in Montana.

COLORADO & SOUTHWESTERN.—Incorporated to build from Grand Junction, Colo., south through Unaweep canyon to La Sal mountain, thence through the Sinbad and Paradox valleys. D. C. Willerby, of London, England; A. E. Guy and John Nix, of Norwood, Colo., and J. H. Hinkin, of Chicago, promoters.

COLORADO, COLUMBUS & MEXICAN.—Projected from Columbus, N. Mex., to Salt Lake City, Utah, about 500 miles. Preliminary surveys made. Address A. O. Bailey, Columbus, N. Mex.

*COLORADO SOUTHERN, NEW ORLEANS & PACIFIC.—This company, controlled by the Rock Island-Frisco interests, is to operate a line from New Orleans west to Houston, 360 miles. Construction is now under way from Baton Rouge, La., west via Eunice, to which the Rock Island, Arkansas & Louisiana is being built from the north, and De Quincy, La., and Beaumont and Liberty, Tex., to Houston, 265 miles. A number of branches are also projected. The Beaumont, Sour Lake & Western, which runs from Beaumont to Sour Lake, 22 miles, is to be used and extended from Sour Lake west to Houston, 65 miles. Contracts for first 55 miles of this line from Sour Lake to Humble let to Kenefick, Hammond & Quigley, Beaumont, Tex. Sub-contracts let to King & Galvin, of Houston, for grading 12 miles from Houston east, and to Sunderman & Dolson, from Sour Lake west: 25 miles from Sour Lake west to Trinity river built last year.

*COLORADO, TEXAS & MEXICO.—Contracts let to the Colorado Construction Co., of Mangum, Okla., for first 46 miles to Chilicothe, Tex., of this proposed line from Mangum, Okla., south to Abilene, Tex., 269 miles; 14 miles completed. Morris R. Locke, President, Mangum, Okla.

COLUMBIA RIVER, OUTLOOK & NORTHWESTERN.—Organized to build from Spokane, Wash., over the Cascade mountains, through Yakima Indian Reservation to Vancouver, Wash. Office at Outlook, Wash. William Stewart and M. C. Stewart interested.

COLUMBIA SOUTHERN.—See Oregon Railroad & Navigation Co.

COLUMBUS & ANNISTON.—Organized to build from Columbus, Ga., to Attalla, Ala. Frank G. Lumpkin, E. H. Hardaway, Howell Hollis and E. K. Cargill, Columbus, Ga., incorporators. (Mar. 16, 1906.)

COLUMBUS & ERIE.—See Erie.

COLUMBUS & SOUTHERN.—Proposed extension from Wyandotte, Ohio, northeast to Lancaster, 15 miles. E. B. Bingham, Toledo, Ohio, interested.

COLUMBUS, MAGNETIC SPRINGS & DELAWARE INTERURBAN.—Incorporated to build electric railroads in Ohio. W. M. Galbraith, Pittsburg, Pa., President; Chris McGee, Jr., Pittsburg, Pa., Vice-President and Treasurer; W. N. Embert, Secretary.

COLUMBUS, NEW ALBANY & JOHNSTOWN TRACTION.—Proposed extension from Gahanna, Ohio, northeast to New Albany and Johnstown, 17½ miles. W. D. Brickell, Despatch Building, Columbus, Ohio, President.

COLUMBUS NORTHERN.—Chartered to build from Columbus, Ga., to Lagrange, 60 miles. Charles L. Davis, of Warm Springs, Meriwether County; O. C. Bullock, T. W. Bates and R. O. Howard, of Columbus, incorporators.

COLVILLE & COLUMBIA RIVER.—Incorporated to build a 19-mile road between Colville, Wash., and Myers Falls, with steamship connections on the Columbia river. A. Wilkes, W. B. Aris, Ellen C. Gilluly, G. K. Gilluly and H. C. Rice, of Spokane, Wash., incorporators.

CONEMAUGH & BLACKLICK.—Organized to build from Josephine, Pa., to the mouth of Tom's Run in Indiana County, five miles. Walter F. Arma, Punxsutawney, Pa., President.

CONEMAUGH VALLEY STREET RAILWAY.—Bond issue of $1,000,000 authorized to build from Johnstown, Pa., to Ebensburg. Headquarters at Johnstown.

CONNECTICUT ROADS (Electric).—Organized to build from East Windsor Hill to Broad Brook and Hazardville, 11 miles. W. O. Burr, F. S. Carey, C. S. Hills, G. A. Gray, C. C. Cook and D. W. Hewes, of Hartford, incorporators.

CONSOLIDATED RAILWAY.—See New York, New Haven & Hartford.

COOK COUNTY & SOUTHERN.—Incorporated to build from Franklin Park, Ill., south to Gary, in Cook County, 12 miles. Office at Chicago. James S. Hopkins, of Chicago, and George W. Child, of Hinsdale, Ill., incorporators. (Mar. 16, 1906.)

*COPPER RIVER.—Proposed line from Cordova, Alaska, north along Copper river to Tanana Junction, with branches from north of Taral east along the Chitana river to Bonanza Mine, and from near the mouth of the Copper river east to east of Bering Lake. Work now under way by M. J. Heney, contractor for the White Pass & Yukon; some grading finished. Permanent organization will not be completed until the line is in operation. Close Brothers, of Chicago and London, are financing the road.

COPPER RIVER & NORTHWESTERN.—Surveys from Valdez, Alaska, northeast to the Copper river, 40 miles, thence to Eagle City, about 270 miles additional. John Rosene, J. D. Trenholme, of Seattle, Wash., and William T. Perkins, of Nome, are interested. Headquarters of the company at Carson City, Nev. (Mar. 16, 1906.)

CORDELE, HAWKINSVILLE & NORTHEASTERN.—Organized in Georgia to build from Cordele northeast to Hawkinsville, 35 miles. J. Polk Brown, P. H. Lovejoy, H. N. Parsons, J. J. Harvard, C. W. Jordan, Jr., and E. J. Henry, of Gainesville, interested. (Mar. 16, 1906.)

CORINTH & SHILOH (Electric).—Incorporated to build from Corinth, Miss., to the National Park at Shiloh, Tenn., 22 miles. W. W. Williams & Co., of Nashville, Tenn., are financing the project.

CORTLAND & AUBURN.—Organized to build from Binghamton, N. Y., northeast to Auburn, 75 miles. Right of way secured; construction work to begin this spring. E. L. Stone, of Homer, N. Y., Secretary.

CORVALLIS & EASTERN.—Surveys made for an extension from Yaquina, Ore., west to Newport, five miles.

COUNCIL BLUFFS, TABER & SOUTHERN (Electric).—Proposed line from Omaha, Neb., to Tarkio, Mo., 70 miles. W. J. Dobbs, of Taber, Iowa, President.

*COUNCIL CITY & SOLOMON RIVER.—In operation from Dickson (Solomon) Alaska, to north of Penelope creek, 32 miles. Extension to Council City, 21 miles, surveyed and to be built this year. Address A. D. Keep, 5 Nassau street, New York.

*COVINGTON & SOUTHWESTERN.—Organized to build from Covington, Ind., southeast to Kingman, thence east to Crawfordsville, 40 miles. Grading completed from Covington to Coal Creek, eight miles. W. G. Ruhl, President, Chicago.

CRESTON & WESTERN.—Organized to build from near Carroll, Iowa, south to Creston, 80 miles. T. Dufer, President, Des Moines; Thomas A. Way and Irving W. Keerl, Vice-President and Treasurer, Mason City, and E. E. Sampson, Treasurer, Des Moines. (Mar. 16, 1906.)

CROSS ISLAND TRACTION.—Incorporated to build an electric line from Brookhaven, Long Island, to West Sayville, 42 miles. L. Baldwin and Paul T. Brady, 11 Pine street, New York, Directors.

CRYSTAL RIVER AND SAN JUAN.—Proposed extension from Marble, Colo., to marble quarries, three miles. C. A. Meek, of Marble, Colo., President.

*CULLMAN & SOUTHWESTERN.—Incorporated to build from Cullman, Ala., south to Bryan, 40 miles. Contract let for 20 miles from Cullman to Bremen. William N. Cooke, G. H. Ten Broeck and A. W. Lilliendahl, Cullman, incorporators.

CULVER & PORT CLINTON.—Projected from Gypsum, Ohio, to East Toledo, and a branch from Harris Township, Wood County, to Bowling Green. G. A. Esch, M. Brennan, J. McNaught, O. M. Knode and O. B. English, Toledo, incorporators. (Mar. 16, 1906.)

CUMBERLAND & NORTHERN.—See Louisville & Nashville.

CUMBERLAND RAILROAD.—Survey being made for extension from the Bush Creek coal fields of Knox County, Ky., to Jellico, Tenn., 17 miles. (Mar. 16, 1906.)

CUMBERLAND RIVER & NASHVILLE.—Surveys being made for a line from Corbin, Ky., to the Tennessee state line, 95 miles. S. Woodward, Carlisle Building, Cincinnati, Ohio, President.

CYNTHIANA & CLAYSVILLE.—Incorporated to build from Claysville, Ky., southwest to Cynthiana, 12 miles.

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DAKOTA & GREAT NORTHERN.—See Great Northern.

DAKOTA MIDLAND.—Incorporated in South Dakota to build from Sioux City, Iowa, northwest to a point in Campbell County, S. Dak., 385 miles. L. R. Giddings, President, and J. A. Frederickson, Chief Engineer, both of 1341 Vine place, Minneapolis, Minn.

DANBURY & PORTCHESTER.—See New York, New Haven & Hartford.

DANVILLE & MT. MORRIS.—Surveys being made from Danville, N. Y., south to Hornell, 16 miles. William Humphrey, General Manager, Danville, N. Y.

DANVILLE & SCOTTSVILLE.—Incorporated in Kentucky to build from Danville southwest to Scottsville, Allen County, 100 miles. J. G. Taylor, of Chicago; G. B. Cooper, Stanford; J. S. Murphy, McKinney; J. Brown, Liberty; J. B. Coffey, Columbus; J. H. Allen, Somerset, and J. Follette, M. M. Perkins, Ralph Leach and J. F. Allen, of Cincinnati, incorporators.

DARIEN & WESTERN.—See Georgia Coast & Piedmont.

DAVIS & TURNER FALLS.—Incorporated with headquarters at Oklahoma City, Okla., to build from Davis, Ind. T., to Turner Falls, 10 miles. A. L. Welch, Robert Chowning, J. W. Grant, R. H. Wilkins and W. M. Demeryx, of Oklahoma City, and John Watts, of Newton, Kan., incorporators.

DAWSON, EL PASO & SOUTHWESTERN.—Incorporated by the Phelps-Dodge interests to build from Dawson, N. Mex., south to Corona, on the El Paso & Southwestern. Surveyed to Las Vegas; work to begin this spring.

DEEPWATER.—See Tidewater.
——See Virginia Railway.

DEERING SOUTHWESTERN.—Proposed extension from Camp, Mo., west to the Missouri-Arkansas state line, 11½ miles, to be done by the company's forces. (Mar. 16, 1906.)

DEKALB, SYCAMORE & INTERURBAN TRACTION.—To build an electric line from Belvidere, Ill., south via Dekalb to Yorkville; also from Sycamore east to Elgin, with branches.

DELAWARE & EASTERN.—New road in operation from East Branch, N. Y., on the New York, Ontario & Western northeast to Arkville, 37 miles. Proposed northern extension to be built by the Schenectady & Margaretsville to Schenectady, 70 miles.
——Proposed southern extension to be built by the Hancock & East Branch southwest to Wilkesbarre, Pa., 160 miles.

*DELAWARE & HUDSON.—The Napierville Junction, from Rouse's Point, N. Y., to St. Constant, Que., on the Canadian Pacific, is approaching completion. The Pacific Construction Co., of Ottawa, is doing the track-laying and ballasting.
——*Contracts let to O'Brien & Mullarkey, of Montreal, for extending the Quebec, Montreal & Southern toward Quebec, from Pierreville, Que., to St. Jean des Chaillons, on the Lotbiniere & Megantic, 48½ miles.
——*Contracts for double-tracking from Schenectady, N. Y., southwest to Delanson, 13 miles, let to Elmore & Hamilton.
——New interchange yard to be built at South Wilkesbarre, Pa. Right of way being obtained.

DELAWARE & SOUTHERN.—Incorporated to build from Deposit, N. Y., northeast to Trout Creek, 17 miles. Charles P. Knapp, of Deposit; W. O. Dennis, of Trout Creek, and G. H. Perigo, of Scranton, Pa., incorporators. (Mar. 16, 1906.)

DELAWARE, LACKAWANNA & WESTERN.—Surveys made for a cut-off from Port Morris, N. J., to Slateford, Pa., 28.7 miles.
——*Work under way on the double-track tunnel through Bergen Hill, N. J., to parallel the present tunnel at 51½ ft. between centers.

DELAWARE SUBWAY.—Organized in Pennsylvania to build from Front and Market streets, Philadelphia, along the Delaware river, one mile. W. P. Brockermann, 620 Fairmont avenue, Philadelphia, President.

DEMOPOLIS & LINDEN.—Incorporated in Alabama by F. M. Abbott, of Selma, and H. McDaniel and B. G. Wilson, of Demopolis, to build 16 miles of railroad.

DENISON & NORTHERN.—Surveys reported from Coalgate and Lehigh, Ind. T., via Davis to Lawton, Okla. T., 125 miles, with east and west lines through the coal fields of the Chickasaw Nation, Ind. T., and in Comanche County, Okla. T. (Mar. 16, 1906.)

DENVER & KANSAS NORTHERN.—See Missouri Pacific.

DENVER & OMAHA SHORT LINE.—Proposed new line between Omaha and Denver. Russell Harding and H. B. Hollins & Co., New York, reported interested.

DENVER & RIO GRANDE—Proposed line from Dotsero, Colo., north to a connection with the Denver, Northwestern & Pacific at Kremmling, about 50 miles.
——Proposed broad-gaging of the line from Montrose, Colo., east to Salida, 136 miles.
——Proposed double-tracking from Adobe, Colo., west to Canyon City, 12 miles; also from Adobe east to Swallows, 13 miles.
——*The Rio Grande Western is building an extension from Revere, Utah, to Bingham Mines, 15 miles.
——Cut-off in Utah from Salina, on the Sevier branch of the Rio Grande Western east to Green River, on the main line west of Grand River, 115 miles; 20 miles out of Salina built, but work stopped. The Utah Construction Co., contractors. (Mar. 16, 1906.)
——Cut-off to be built from Westwater, Utah, west to Thompsons, about 30 miles. (Mar. 16, 1906.)
——Surveys reported for a cut-off from Fort Garland, Colo., south to Embudo, N. Mex., 95 miles. (Mar. 16, 1906.)
——Projected branch from Sargents, Colo., north to Tomichi, 12 miles. Preliminary work begun. (Mar. 16, 1906.)

DENVER, ENID & GULF.—See Atchison, Topeka & Santa Fe.

DENVER, KANSAS & GULF.—See Atchison, Topeka & Santa Fe.

DENVER, LARAMIE & NORTHWESTERN.—Organized at Laramie, Wyo., to build from Denver, Colo., to the northern boundary of Wyoming, 450 miles. S. Johnson, President; W. R. West, Vice-President; R. H. Dwyer, Second Vice-President and General Manager; S. Kent, Third Vice-President; J. O. Curry, Treasurer, and J. T. West, Secretary.

DENVER NORTHERN (Electric).—Organized to build from Denver north to Cheyenne, Wyo. W. C. Brown, Senior Vice-President of the New York Central; M. J. Jones, of Boulder; R. S. Law and C. W. Waterman, of Denver, reported interested.

*DENVER, NORTH-WESTERN & PACIFIC.—Building from Denver, Colo., to Salt Lake City, Utah, 500 miles. In operation to Kremmling, 126 miles. Contract let to Dunphey & Nelson, from Kremmling to Azieve, five miles, and to Orman & Crook, from Azieve to Steamboat Springs, 85 miles.

DENVER SOUTHEASTERN.—Organized to build from Denver, Colo., south to Raton, N. Mex., 225 miles, with a branch from Pueblo east via Las Animas to Amity, about 150 miles additional. Walter H. Tunis, L. W. Herney, W. O. Temple, H. O. Tunis, W. C. K. Duhn and T. B. Doan, of Denver; I. C. Cockey, of Washington; F. A. Sherwood, of Philadelphia, and R. D. Whiting, of New York, interested.

DENVER TRANSCONTINENTAL. — Incorporated to build from Denver, Colo., southwest to San Diego, Cal., 850 miles. Wm. A. L. Cooper, of Denver; R. E. Vidler, of Georgetown, and C. A. Baldwin, of Colorado Springs, incorporators.

*DENVER, YELLOWSTONE & PACIFIC.—Proposed line from Denver, Colo., to Walcott, Wyo., 250 miles. Contracts let from Denver to Collins, 65 miles, and from Walcott, Wyo., to Encampment, 45 miles. Grading under way. W. R. West, of Laramie, Wyo., and John D. Milliken, McPherson, interested. (Mar. 16, 1906.)

DES MOINES & MISSOURI.—Rights of way secured for proposed line from Des Moines, Iowa, south to Seymour, 80 miles. G. Wright and Clark M. Garver, of Des Moines, interested. (Mar. 16, 1906.)

*DES MOINES, IOWA FALLS AND NORTHERN.—Building the St. Paul & Des Moines from Iowa Falls, Iowa, north to Mason City, 45 miles. R. A. Elzy, of Marshalltown, Iowa, contractor; 10 miles built; 6 miles more of grading completed.

DES MOINES, WINTERSET & CRESTON (Electric).—To build from Des Moines, Iowa, southwest to Creston, 65 miles. A. E. Park, General Manager, Des Moines.

DETROIT & GRAND RAPIDS.—Organized to build from Farmington, Mich., northwest to Corunna, thence north to Saginaw, 100 miles. E. P. Sherman, Bancroft, Mich., President.

DETROIT & MACKINAC.—Proposed branch from Alpena, Mich., west towards Boyne City.

*DETROIT RIVER TUNNEL CO.—See Michigan Central.

DETROIT, TOLEDO & IRONTON.—Surveys made for building from Ashland, Ky., up Hoods creek, East fork and down Bear creek to the Big Sandy river, thence up that river to the mouth of Shelby creek, 118 miles. From this point a branch to be built up Long Fork creek, 23 miles, to coal properties. The Ashland & Ironton Bridge Co. is now building a bridge over the Ohio river at Ashland. Another branch is to be built up Shelby creek, 20 miles, and a third branch will be built up Beaver creek to the Beaver creek coal fields, 36 miles. J. F. Prindivle, Paintsville, Ky., is Engineer in charge.
——Proposed extension of Kingman branch from Kingman, Ohio, to Harveyburg, five miles.

DONIPHAN, KENSETT & SEARCY.—Extension from Kensett west to Searcy, Ark., 4½ miles, to be built. H. R. Kilpatrick, Kensett, is General Manager.

DOUGLAS, AUGUSTA & GULF.—See Georgia & Florida.

DOVER & SOUTH BOUND.—Proposed extension from Richlands, N. C., southeast to Swansboro, 30 miles. (Mar. 16, 1906.)

DUBLIN & SOUTHWESTERN.—Proposed extension from Eastman, Ga., southwest to Cordele, 35 miles.

DUBUQUE, IOWA & WISCONSIN.—Organized to build from Dubuque, Iowa, through Illinois and Wisconsin. J. M. McFadden, Dubuque, A. W. Tredway, F. J. Piekenbrock, H. H. Blish and J. E. Hedley, Directors.

*DULUTH & NORTHERN MINNESOTA.—Building with its own forces a 4-mile extension.

*DULUTH, MISSABE & NORTHERN.—Building with its own forces a branch to the Wacootah mine, 1.74 miles; and one from Myer's mine to Hartley mine, one mile; also one from Glen mine to Pillsbury mines, 0.9 mile.

*DULUTH, RAINY LAKE & WINNIPEG.—Contracts let to the Minnesota Land & Construction Co. for an extension from milepost 50 north to Rainier, Minn., 35 miles.
——Proposed extension from Rainy Junction, Minn., south to Duluth, 70 miles.

DULUTH, VIRGINIA & RAINY LAKE.—See Duluth, Rainy Lake & Winnipeg.

DUQUOIN RAPID TRANSIT.—Proposed interurban line from Benton, Ill., northwest to Belleville, 75 miles. Office at Duquoin, Ill.

DURHAM & SOUTHERN.—Proposed extension from Dunn, N. C., southeast to Southport, at the mouth of Cape Fear river, 100 miles.

*DYERSVILLE & NORTHERN.—Building from Dyersville, O., to New Vienna, five miles. Contract let to E. L. Tobie, of St. Paul, Minn. Grading completed. E. C. Peaslee, of Dubuque, Iowa, is interested. (Mar. 16, 1906.)

E

EAGLE VALLEY.—Projected from Baker City, Ore., east to the Snake river, 75 miles. David Eccles, Ogden, Utah, and W. L. Vinson, of Baker City, reported interested.

EAST CENTRAL.—Incorporated to build from Ormond, Fla., south to Daytona, thence west to De Land, thence south to Sanford and Orlando, 70 miles. E. L. Potter, Seabreeze, Fla., President.

EAST SIDE VIADUCT.—Incorporated to build an elevated railroad from the terminus of the Harlem river branch of the New York, New Haven & Hartford at Willis avenue in the Borough of the Bronx, New York City, southward across the Harlem river and thence between First avenue and Avenue A to East 34th street, Manhattan. Proposed to build a six-track stone viaduct between Avenue A and First avenue and across Jefferson Park. O. W. Barnes, Fishkill, N. Y.; C. H. Cook, O. B. Nairs and L. C. Twombley, of New York, and F. H. Loomis, of Stuebenville, Ohio, Directors.

EASTERN OF OKLAHOMA.—See Atchison, Topeka & Santa Fe.

EASTERN SIERRA & PACIFIC.—Incorporated as the Sierra Pacific and consolidated with two other companies. Construction work to begin near Walker Pass, Cal., on line to San Luis Obispo. Work will be let in 40-mile sections. Otto Bashore, President, Porterville, Cal.; C. B. Reas, Second Vice-President, of Success, Cal.; George D. Avery, Secretary; J. W. Davis, Treasurer, and G. B. Mitchell, General Manager, all of Porterville.

*EASTERN TENNESSEE & WESTERN NORTH CAROLINA.—Laying third track to make the road double gage from Elizabethton, Tenn., to Hampton, five miles.

EASTERN TEXAS.—Proposed extension from Kennard, Tex., west to Crockett, 15 miles.

EASTERN WASHINGTON.—Projected line from Fletcher, Adams County, Wash., southwest to Connell, 30 miles. E. W. Swanson, Spokane, Wash., is interested. Surveys completed. (Mar. 16, 1906.)

EAST ST. LOUIS, COLUMBIA & WATERLOO.—Proposed new line from East St. Louis, Ill., south to Waterloo, 23 miles. Surveys. E. F. Schoening, Columbia, Ill., President.

*EDDY LAKE & NORTHERN.—Contract let to R. E. Broty for extension from Brown Swamp, S. C., to Marion, 20 miles.

ELECTRIC TERMINAL OF KANSAS CITY.—Incorporated in Missouri, to build a line five miles long within Kansas City. John Mayer, Parsons, Kan.; G. H. Kahmann, B. Steele, W. E. Winner and H. G. Pert, all of Kansas City, incorporators.

*EL DORADO & WESSON.—Building from El Dorado, Ark., to Wesson, 10 miles. Contracts let to A. J. Seymour for seven miles, and to James Ulmer for three miles. Grading completed for seven miles, and track laying to be begun this month. James Harrington, Chief Engineer, El Dorado, Ark.

*ELDORADO, MARION & SOUTHWESTERN.—Work started on this line from Eldorado, Ill., through Marion, west to a point on the Mississippi river. Contract let for grading east of Marion to Charles E. Larue. S. T. Brush, Carbondale, Ill., President, and F. Hutchinson, Chief Engineer.

ELK, BIRCH & GAULEY.—Incorporated to build from the Birch river, in Braxton County, W. Va., southeast to Camden-on-Gauley, 30 miles. P. T. West, Grafton; G. S. Bennett, Amos; C. A. Shaw, Shinnston, and E. T. Tetrick, Clarksburg, W. Va., incorporators.

ELKHORN SOUTHERN.—Incorporated with office at Bristol, Va., to build from the Virginia-Kentucky state line near the Big Sandy river into Dickerson or Buchanan Counties, Va., 40 miles, with branches. Geo. L. Carter, President, Bristol, Va.

ELK SHORT LINE.—Incorporated to build near the village of Elk Rapids, Mich. Homer Sly and Milton B. Lang, of Elk Rapids, Directors.

ELMIRA, CORNING & WAVERLY (Electric).—See Erie.

*ERIE.—Proposed improvement of Jersey City terminal approved by city officials. The plans provide for an open cut 70 ft. deep and 4,500 ft. long through Bergen Hill for passenger trains. There will be four passenger tracks. The tracks will run on an elevation in the city east of the tunnel to a new station. The present tunnel will be used for freight trains. The company has bought a large tract of land at the western end of the tunnel, and the city has vacated five blocks on the meadows; also tracks at Barnum street and at Ninth street. There will be about 120,000 cu. yds. of earth and 480,000 cu. yds. of rock to be excavated, and 15,000 cu. yds. of concrete masonry to be built. The Penborn Creek Railroad has been incorporated to build this short line. Contract let to the Millard Construction Co., Philadelphia, Pa.
——*Contract let for the electrification of 34 miles from Rochester to Avon and Avon to Mount Morris, to Westinghouse, Church, Kerr & Co., of New York. Work about finished. Estimates made for electrifying the rest of the Rochester division from Avon to Corning, 76 miles.
——*Contract let to Bennett & Talbot, of Greensburg, Pa., for building the first section of 12 miles of the Guymard cut-off (Erie & Jersey) from Howells, N. Y., to Guymard, 42 miles. This includes a 5,300-ft. double-track tunnel through the Shawangunk mountains. Additional contracts let between Highland Mills and Guymard as follows: Newburg Junction to Woodbury, Sundstrum & Stratton, New York; Woodbury to Moodna Creek, John F. Shields, Richmond Hill, Long Island; Moodna Creek viaduct, steel work is being done by the company's forces, masonry work by Smith-McCormick Co., Belfast, N. Y.; Moodna Creek to Otterkill, Ferguson Contracting Company, New York City; Otterkill to Stony Ford, Lathrop, Shea & Henwood Co., Scranton, Pa.; Stony Ford to Howells, F. M. Clement & Co., Philadelphia, Pa.
——*Building under the name of the Columbus & Erie, a new double-track main line from Lakewood, N. Y., southwest to Columbus, Pa., 23 miles. Contracts from Lakewood to Grant, N. Y., let to Burke Bros., of Scranton, Pa., and from Grant to Columbus, Pa., to J. G. White & Co., of New York; 2½ miles built.
——*Contracts let for work on the Genesee River Railroad from Hunts, N.Y., south to Cuba, as follows: Hunts to Rossburg, Millard Construction Co., Philadelphia, Pa.; Rossburg to Black Creek, W. H. Coverdale & Co., New York; Black Creek to Cuba, Bennett & Smith, Wilkinsburg, Pa.

——Double-tracking from Carrollton, N. Y., to Cuba, 25 miles. To be done in connection with the low-grade line being built from Cuba to Hunts, N. Y.
——*Contract let to the McGinty Contracting Co., of Minerva, Ohio, to build a concrete subway at the eastern end of its yards at Randall, Ohio.
——*Erie reported to be financing the Elmira, Corning & Waverly (electric), building from Waverly, N. Y., to Elmira, on the right of way of the Erie, and to buy the Waverly, Sayre & Athens Traction Co. and extend it to Binghamton.

ERIE & JERSEY.—See Erie.

*ERIE, CAMBRIDGE SPRINGS, UNION & CORRY (Electric).—Contract reported let to Charles Van Bibber, of Boston, for building from Erie, Pa., to Corry, with branch to Cambridge Springs, in all 40 miles.

ESSEX COUNTY TRACTION.—Incorporated to build from Westport, N. Y., on Lake Champlain west to Newman, Essex County, 49 miles. A. S. Washburn and N. C. Speer, of Hartford, Conn.; W. L. Kiley and George S. Raley, of Glens Falls, and R. L. Trumbull, of Ausable, N. Y., Directors.

EVANSVILLE, MT. CARMEL & NORTHERN.—See Cleveland, Cincinnati, Chicago & St. Louis.

F

FALLON RAILWAY.—See Southern Pacific.

FALLS CITY, SYCAMORE SPRINGS, SABETHA & SOUTHWESTERN.—Incorporated to build from Falls City, Neb., south to Topeka, Kan., 100 miles, with a western line from a point near Sabetha, in Nemaha County, Kan., west 320 miles. Samuel Kimmel, of Falls City, Neb.; E. V. Kauffman and H. Reding, of Sabetha, and W. A. S. Bird, of Topeka, Directors. (Mar. 16, 1906.)

FALMOUTH RAILROAD.—Incorporated in Virginia to build from a point in Stafford County west of Falmouth east to tidewater on the Rappahannock or Potomac rivers, 25 miles. W. E. Grant, President, Richmond, Va.

*FLORIDA EAST COAST.—Extension from Homestead, Fla., southwest along Florida Keys to Key West, 126 miles; 37 miles built to southern end of Key Largo.

FLORIDA RAILWAY.—Proposed extension from Liveoak, Fla., northeast to Fernandina, 150 miles.

FLORIDA ROADS (Electric).—Franchise granted to William H. Evers Engineering Co. to build from Tampa, Fla., east to Bartow, 45 miles.

FORT SMITH, INDIAN TERRITORY & TEXAS. Projected line from Panama, Ind. Ter., southwest to Wilburton, Ind. Ter., 50 miles. Western Land & Construction Co., of Memphis, promoters.

*FORT WAYNE & SPRINGFIELD.—Projected from Fort Wayne, Ind., south to Portland, 48 miles. Graded from Fort Wayne to Decatur, 21 miles; track laid for two miles. (Mar. 16, 1906.)

*FOURCHE RIVER VALLEY & INDIAN TERRITORY.—Contract let to Robert G. Jenkins, of Fourche, Ark., for extension from Camp D, in Arkansas, to the west line of Perry County, 38 miles.

*FOX RIVER (Electric).—Eight miles of track laid and all grading completed on this projected line from Manitowoc, Wis., south to Sheboygan, 30 miles. O. C. Beahnke, Manager, Manitowoc.

FRANKLIN & CLEARFIELD.—See Lake Shore & Michigan Southern.

FRANKLIN SOUTHEASTERN.—Incorporated in Georgia to build from Franklin to either Hogansville or LaGrange. W. Nussbaum, N. W. Wick, A. J. Crovatt, J. S. Wright and J. Y. Brame, of Brunswick, Ga.; C. W. Demming, of LaGrange, Ga., and E. Brovston, of Jacksonville, Fla., incorporators.

*FREEO VALLEY.—Contracts let to S. R. Neu, of Princeton, Ark., for extension in Arkansas from mile post 22 to mile post 26.

FRISCO, OKLAHOMA & TEXAS.—See St. Louis & San Francisco.

FRONT ROYAL, RAPPAHANNOCK & TIDEWATER.—Preliminary surveys from Front Royal, Va., to Griglersville, 50 miles. Hugh E. Naylor, Secretary, Front Royal.

G

*GAINESVILLE & GULF.—Building under the name of the Tampa & Jacksonville extension from Sampson, Fla., northeast to Jacksonville, 50 miles, and from Fairfield south to Tampa, 150 miles. Contracts let to the American Construction Co., Gainesville; sub-contract let to W. H. Jones for grading 53 miles.

*GAINESVILLE, WHITESBORO & SHERMAN.—Chartered to build from Sherman, Tex., east to Gainesville, 32 miles. G. A. Hassinger, H. H. Lazarus, of New Orleans; H. G. Stinnett, of Sherman; S. B. Cowell, of Whitesboro, and John King of Gainesville, incorporators. Office at Gainesville.

GALVESTON HOUSTON INTERURBAN.—Organized to build from Galveston, Tex., north to Houston, with branch lines east to Laporte and Seabrook. J. O. Ross, President; Henry House, Vice-President, and F. L. Dana, of Colorado Springs, Secretary.

GALVESTON TERMINAL.—See Colorado & Southern.

GASSAWAY, ELK RIVER & HUTTONSVILLE.—Chartered to build from Gassaway, W. Va., southeast to Webster Springs, 25 miles; also an extension from Webster Springs northeast to Huttonsville, 35 miles. J. M. Hoover, Webster Springs, incorporator.

GATES CITY TERMINAL.—See Atlanta, Birmingham & Atlantic.

GENESEE RIVER.—See Erie.

GENEVA, PHELPS & NEWARK (Electric).—Authorized to build from Geneva, N. Y., north to Newark, 15 miles.

*GEORGIA & FLORIDA.—This system is building an extension of the Augusta & Florida from Keysville, Ga., north to Augusta, 26 miles, and proposes to extend the Douglas, Augusta & Gulf from Barrows Bluff, Ga., north to Rockledge, 50 miles. Two pieces of road aggregating 50 miles must be built to give a through line from Augusta south to Madison, Fla. A line is also projected to Savannah, Ga., which involves building from Summit to Statesboro, 26 miles.

GEORGIA & FLORIDA PINE BELT.—Incorporated to build from Waycross, Ga., southwest to Statenville, Ga., 60 miles. W. B. Ellington, W. W. Sharp, G. R. Yeoman, J. S. Bailey, of Ware County; W. C. Dodson, C. J. Haden and B. W. Blackstock, of Atlanta, incorporators.

GEORGIA COAST & PIEDMONT.—Surveys being made for an extension from Darien, Ga., south to Brunswick, 17 miles.

GEORGIA EASTERN.—Incorporated to build from Americus, Ga., east to Eastman, 80 miles. J. P. Heard, Vienna, Ga., incorporator.

*GEORGIA, FLORIDA & ALABAMA.—Work under way on an extension from Cuthbert, Ga., north to Columbus, 63 miles.

GEORGIA NORTHERN.—Proposed extension from Boston, Ga., southwest to Monticello, Fla., 19 miles.

GEORGIA, SOUTHWESTERN & GULF.—Chartered to build from Dawson, Ga., via Albany to point in Washington County, Fla., 175 miles. W. M. Legg, H. J. Brewton, A. H. Russell, M. D. Powers, W. M. Gordon, Jr., of Dawson; W. H. Milton, Miami, Fla.; E. V. Babcock and F. R. Babcock, of Pittsburg; E. S. Peter and J. H. Pope, of Chicago, incorporators.

GEORGIA ROADS.—Proposed line from Social Circle, Ga., south to Mansfield, 10 miles. Colonel J. N. Preston and Captain A. W. Roberts, of Atlanta, and T. A. Perry, of Decatur, are interested.

GILA VALLEY, GLOBE & NORTHERN.—See Southern Pacific.

GILPIN & CLEAR CREEK DISTRICT.—Proposed line 17 miles long to mines in Gilpin County, Colorado. John C. McShane, President, and R. H. Carpenter, Central City, Colo., Chief Engineer. (Mar. 16, 1906.)

GLEN MARY.—Incorporated to build from Glen Mary, Tenn., southeast to Oliver Springs, 28 miles. J. N. Scott and Robert Walton, of Roane County, incorporators.

GLENVILLE & KANAWHA.—Surveys being made for proposed line from Glenville, W. Va., northeast to Weston, 30 miles. R. L. Ruddell, General Manager, Glenville, W. Va.

GOSHEN, SOUTH BEND & CHICAGO (Electric).—Incorporated to build from the northern end of the Ohio-Indiana state line to Hammond, Ind., 140 miles. Part of the proposed Chicago-New York Electric Air Line.

GRAND RAPIDS TERMINAL BELT.—Incorporated to build a belt line around the city of Grand Rapids, Mich. Grading work will begin this spring. E. H. Christ, Chief Engineer, Grand Rapids, Mich.

GRANITE CITY & EAST ST. LOUIS TERMINAL.—Incorporated with office in Chicago to build from Granite City, Ill., to East St. Louis. Charles G. Lucas, P. A. Nueffer, H. H. Phillips, H. B. Herd and R. M. Cole, Directors.

*GRAY'S HARBOR & PUGET SOUND.—Incorporated to build from Aberdeen and Hoquiam, Wash., west to Centralia, 75 miles. Construction under way. A. J. West, President; J. B. Bridges, Counsel; W. J. Patterson, Treasurer and General Manager; J. F. Richards, Purchasing Agent and Assistant Auditor, all of Aberdeen, and J. M. Clapp, Chief Engineer and Auditor, of Seattle. Office at Aberdeen.

GREAT BEND & GULF.—Chartered to build from Great Bend, Kan., south to Medicine Lodge, 80 miles. R. C. Otis, B. C. Sammons, H. S. Duncome, R. Pringle, of Chicago; F. V. Russell and G. L. Chapman, of Great Bend, Kan., incorporators. (Mar. 16, 1906.)

*GREAT NORTHERN.—The Billings & Northern is building a connecting line between the Great Northern and Montana Central on the north and the Northern Pacific and Burlington on the south. Grading under way from Armington, Mont., to Laurel, 199 miles.
——*New line to be built in Canada from Vancouver to Winnipeg. The Vancouver, Victoria & Eastern is building the western end. Tracks laid from the international boundary at Midway, B. C., west to crossing of the Similkameen river, eight miles beyond Oroville, 64 miles. Work under way to Keremeos, 32 miles further. Contracts let soon, Keremeos to Princeton, 45 miles. Eastern part of through line probably via Fernie, B. C., Medicine Hat and Regina, Sask., and Portage la Prairie, Man., to Winnipeg.
——*Minneapolis & Great Northern extension from Greenbush, Minn., to Warroad, 44 miles, is graded but no track laid.
——*Projected branch from Wenatchee, Wash., northeast to Oroville, 140 miles. Three contracts let between Orondo and Wenatchee; also from Oroville south.
——Proposed change of over 100 miles of main line from Cut Bank, Mont., to Belton; new line to be 17 miles shorter.
——Surveys between Spokane and Newport, Wash., 70 miles, to secure a more direct route and lighter grades.
——Proposed branch from Grand Forks, N. Dak., north on the east side of the Red River to Drayton, passing between Olson and Alvarado, Minn. (Mar. 16, 1906.)
——Maps filed showing location of proposed extension from Summers, Flathead County, Mont., east to Holt, thence along the east side of Flathead lake to the northern side of Flathead reservation, 60 miles. (Mar. 16, 1906.)
——Surveys from Rugby, N. Dak., southwest to Balfour, thence southwesterly to coal lands. (Mar. 16, 1906.)
——See Portland & Seattle.

GREAT SOUTHERN.—To build remaining 22 miles between The Dalles, Ore., and Tygh Valley with its own forces.

GREEN BAY, OSHKOSH, MADISON & SOUTHWESTERN.—See Wisconsin & Northern.

GREENFIELD & SOUTHEASTERN.—Incorporated to build from Greenfield, Ark., southeast to Marked Tree, 20 miles. W. H. Howe, of Greenfield; S. E. Howe, of Logansport, Ind., and J. J. Mardic, of Harrisburg, Directors. (Mar. 16, 1906.)

GREENSBURG & WESTERN (Electric).—See West Penn Railway.

GREENVILLE & ROLLINGFORD (Electric).—Incorporated to build from Leland, Miss., through Greenville and Rollingford.

GREENVILLE, GREENWOOD & KNOXVILLE.—Projected line from Greenville, S. C., to Greenwood, 50 miles. H. H. Prince, Greenville, S. C., interested. (Mar. 16, 1906.)

*GREENWICH & JOHNSONVILLE.—Building extension from Greenwich, N. Y., to Salem, 12 miles. A. A. Parker, Superintendent of Construction.

GULF & NORTHWESTERN.—Surveys from Waco, Tex., northwest to Strawn, 120 miles. Projected an additional 250 miles from Strawn northwest to Plainview. P. A. McCarthy, Lufkin, Tex., Chief Engineer.

GULF & SABINE RIVER.—Incorporated to build from Leesville, La., southwest to Merryville, 35 miles. T. H. Fullerton, J. L. Reaves, G. W. Johnson, F. L. Feihen and C. S. Maillard, Directors. Office at Leesville.

GULF, BROWNWOOD & CISCO.—To build during 1907 from Brownwood, Tex., to Cisco, 50 miles. Address G. H. Connell, Fort Worth, Tex.

*GULF, COLORADO & SANTA FE.—Contracts let to the Grigsby Construction Company, of De Ridder, La., for extending the Jasper & Eastern from Cravens, La., to Oakdale, 25 miles.
——Proposed connecting line from Center, Tex., to Timpson, 15 miles.
——Projected line from the northern end of the Texas & Gulf at Longview, Tex., to a point on the Red river, 125 miles, to be eventually extended northwest to Indian Territory, 150 miles.
——Proposed line from Winnie, on Gulf & Interstate division to Houston, 60 miles.

*GULF, HUTCHINSON & NORTHWESTERN.—Building from La Crosse, Kan., north to Hays, 25 miles. Projected from Hays north to Phillipsburg, 75 miles, and from La Crosse southeast to Hutchinson, 100 miles. Address Eugene Tillen, Hutchinson, Kan.

GULF, PLAINVILLE & NORTHERN.—Chartered to build 60 miles from Plainville, Kan., north to the Nebraska state line. Office at Plainville.

GULFPORT & NORTHWESTERN.—Surveys for line from Gulfport, Miss., northwest to Poplarville, 45 miles. Edward Hines, Chicago, President; E. F. Barthe, First Vice-President; A. McAlpin, Second Vice-President; F. A. Weyerhaeuser, St. Paul, Minn., Treasurer; C. F. Wiehe, Secretary; S. J. Cusson, General Manager.

GURDON & FORT SMITH NORTHERN.—See Missouri Pacific.

GURLEY & PAINTROCK VALLEY.—Organized by the Cleveland Coal & Iron Co. to build nine miles from Gurley, Ala. George E. McNeil, President, and J. D. Austin, Secretary, Treasurer and General Manager, both of Chicago.

H

HAMMOND & SOUTHERN.—Incorporated to build from Hammond, Ark., east to Hervey, 10 miles. L. Evers, of Hammond; J. W. Stayton and J. Volkner, of Newport, interested. (Mar. 16, 1906.)

HAMPSHIRE SOUTHERN.—Incorporated to build from Springrun, W. Va., southwest to Durbin. John T. McGraw, of Grafton; J. J. Cornwell, of Romney, and W. B. Cornwell, of Fairmont, incorporators.

HAMPTON & YORKTOWN (Electric).—Incorporated to build from Hampton, Va., to Yorktown, 19 miles. Surveys.

HANCOCK & EAST BRANCH.—See Delaware & Eastern.

HANNIBAL & KIRKVILLE.—Proposed line from Hannibal, Mo., northwest to Kirkville, 75 miles. (Mar. 16, 1906.)

HANOVER RAILWAY.—Incorporated to build from Hanover, Ill., to North Hanover. Office at Hanover. William Speer, John Eadie and Albert B. White, of Hanover, incorporators.

HARBOR SPRINGS.—Surveys for extension from Indian Garden, Mich., to Dutch Church, two miles

*HARRISBURG & OHIO RIVER.—D. E. Baxter & Co., Inc., New York, have contracts for building this line from Galatia, Ill., southeast to Harrisburg, nine miles. T. Edwin Bell, of Hammond, Ind., President.

HARTWELL & WASHINGTON.—To build from Washington, Ga., north to Hartwell, 60 miles. W. J. Anderson, Washington, Ga., incorporator.

HATTIESBURG & MAMMOTH SPRINGS (Electric).—Incorporated to build from Hattiesburg, Miss., south to Mammoth Springs, 12 miles. E. F. Ballard and J. Fitch interested.

HAYS CITY & GREAT NORTHERN.—Organized to build from Great Bend, Kan., northwest to Hays, thence north to point in Rooks or Graham County, 90 miles. E. L. Peckham, of Blackwell, Okla. T., and H. T. Shaffer, of Hays City, interested.

HILLSBORO, KIMMSWICK & NORTHERN.—Incorporated to build from Hillsboro, Mo., northeast to St. Louis, 23 miles. H. W. Gulke, A. F. Furrer, Lee A. Hall, Charles A. Gulke and James J. Ring, St. Louis, interested.

HILLSBORO NORTHEASTERN.—Proposed extension from Hillsboro, Wis., southwest to Richland Center, 28 miles.

HIWANEE & TOMBIGBEE.—Organized to build from Hiwanee, Miss., to the Tombigbee river in Alabama, 35 miles. Col. E. L. Russell, of Jackson, Miss., interested.

HOBOKEN & MANHATTAN.—See Hudson & Manhattan.

HOLLY RIVER & MADISON.—See West Virginia Midland.

*HOLSTON RIVER.—Incorporated to build from Rogersville, Tenn., northeast to Bristol, 45 miles. Contract let to the Callahan Construction Co. Grading begun last summer. Sub-contract let to J. R. Oates, of Ashville, N. C., for 10 miles near Moccasin Gap. John B. Newton, Bristol, Tenn., interested.

HOMAN & SOUTHERN.—Incorporated to build from Homan, Miller County, Ark., northeast to Harvey, 10 miles. C. B. Kelley and H. G. McBurney, of Homan, interested. (Mar. 16, 1906.)

*HOOD RIVER.—Contracts reported let to Archie Mason and Giebisch & Joplin; 16 miles of this projected road along the east bank of Hood river in Oregon. (Mar. 16, 1906.)

HORNELL, BATH & LAKE KEUKA (Electric).—Incorporated to build from Hornell, N. Y., northeast to Jerusalem, 46 miles. John F. Turk and Charles G. Wheeler, of Hammondsport; Fred W. Hastings, Wilson R. Campbell, Moses Davison, Dr. W. H. Phillips, G. H. Parkhurst and Frank N. DeCamp, of Bath, and L. D. Whiting, of Canisteo, N. Y., Directors.

HOT SPRINGS, OUACHITA & MENA.—See Kansas City Southern.

*HOUSTON, SABINE & RED RIVER.—Contract let in July, 1906, to C. Rice. Proposed route from Houston, Tex., north and northeast to Alexandria, La., about 200 miles. About 22 miles of grade completed. H. W. Cortes, President; Edwin Kennedy, Vice-President, and J. M. Cotton, Secretary, all of Houston.

*HUDSON & MANHATTAN.—Work includes twin tunnels from Jersey City under the North river to Cortlandt and Dey Streets, New York; also a twin tunnel from Hoboken under the North river to Christopher street, and a subway through Christopher street to Sixth avenue, and along Sixth avenue to 33d street. A connecting line will be built from the Lackawanna terminal in Hoboken on the north, south to the present Pennsylvania terminal in Jersey City. From here a line is projected to Newark to be used by fast electric trains. The tunnels to Hoboken are finished. At the Manhattan end they extend from the shaft near the foot of Christopher street to near Christopher street and Ninth avenue. Contract for subway up Sixth avenue to Sixth avenue and Thirty-third street, New York, about one mile, let to Degnon Contracting Company. The two tubes from Jersey City have been bored about three-fourths of the way, and work on the tunnels for the Jersey connections of the under river tubes is about half done.

HUDSON RIVER & EASTERN TRACTION.—Authorized to build from Ossining, N. Y., east through Briarcliff Manor and Pleasantville to Sherman Park, nine miles. F. E. Stratton, President of the Northern Westchester Traction Co., White Plains, N. Y., President.

HUNTINGTON RAILROAD (Electric). — This company has been authorized to build an electric line from Huntington, on the Long Island Railroad, southwest across Long Island to Amityville, 15 miles. Work to be begun by April 1, 1907, and completed by October, 1908.

HUNTSVILLE & BIRMINGHAM (Electric).—Incorporated to build from Huntsville, Ala., south to Birmingham, 80 miles. C. T. Briggs, of Joppa, President; L. J. Hanners, of Cullman, Vice-President; T. W. Riddle, of Holly Pond, Secretary, and F. T. Petty, of Huntsville, Treasurer and Attorney. Office at Huntsville.

I

IDAHO NORTHERN.—Proposed line from Kingston, Ida., northeast to Murray, 22 miles; also from Murray south to Wallace, 20 miles. B. F. O'Neill, President of the State Bank of Commerce, Wallace, President.

*ILLINOIS CENTRAL.—Building from Corinth, Miss., southeast to Haleyville, Ala., 80 miles, as part of its Birmingham extension. The line in Mississippi under the name of the Mississippi & Alabama, 42 miles, and the remainder in Alabama under the name of the Alabama Western, 38 miles. Contracts for the Mississippi & Alabama let to Smith & Scott, of Corinth. About 85 per cent. of the grading is completed and track laid for over three miles. On the Alabama Western, contracts let to the Tallay-Bates Construction Co., Memphis, Tenn.; L. E. Myers Co., Chicago, Ill., and to Smith & Scott, of Corinth, Miss.; also to the Strobel Steel Construction Co., of Chicago, Ill., for the Brush Creek viaduct. Grading 44 per cent. completed, and track laid for two miles.

——*Yazoo & Mississippi Valley let contracts to N. J. Roach & Co. and P. H. Rogers of Memphis, Tenn., and to J. D. Lynch, of Monmouth, Ill., for work from Holly Bluff, Miss., to Kelso, 13.3 miles; Etter, Tenn., to Lake View, Miss., 6.7 miles; Leland, Miss., southwest 10.8 miles, and Philipp, Miss., to Charleston, 27.6 miles; a total of 58.4 miles.

ILLINOIS, INDIANA & GARY.—With the Milwaukee, Rockford & Eastern, to build a double-track line from Gary Ind., north to Milwaukee, Wis., 230 miles. B. H. Harris and F. Clark, Chicago; J. C. Duffin, Dekalb, Ill., and H. W. Seaman, Clinton, Ia., incorporators.

*ILLINOIS VALLEY (Electric).—Incorporated to build from Joliet, Ill., southwest to Morris, thence west to Spring Valley. Grading under way. F. W. Bedard, La Salle, Ill., interested.

ILWACO RAILWAY & NAVIGATION.—See Oregon Railroad & Navigation Co.

INDIANA, CLEARFIELD & EASTERN (Electric).—See Keystone Air Line.

INDIANA, COLUMBUS & EASTERN TRACTION.—Organized in Ohio to build from Dayton, O., west to Richmond, Ind., 100 miles.

INDIANAPOLIS, CHICAGO & LOGANSPORT.—Surveys made and rights of way secured from Indianapolis, Ind., north to Logansport, 80 miles. Walter A. Osmer, Chief Engineer, Logansport, Ind.

INDIANAPOLIS & LOUISVILLE.—See Chicago, Indianapolis & Louisville.

INDIANAPOLIS, COLUMBUS & SOUTHERN TRACTION.—Contract let to Howard Lee for grading 20 miles on an extension from Columbus, Ind., south to Seymour.

*INDIANAPOLIS, HUNTINGTON, COLUMBIA & NORTHWESTERN.—Grading begun in September, 1906, from Indianapolis, Ind., to Goshen, 155 miles. Contracts let to M. V. Ryan, of Syracuse, Ind., for building from Huntington to Goshen, 60 miles. Grading completed from Wawasee Lake to Benton, 11 miles, and tracklaying to be started this spring. Denver L. Horner, of Syracuse, Ind., Chief Engineer.

INDIANAPOLIS, NEW CASTLE & TOLEDO (Electric).—To be built by the Electrical Installation Company of Chicago. Main line will be from Indianapolis to New Castle, Ind., with branch lines as follows: Indianapolis to New Castle, 45 miles; Maxwell to Greenfield, five miles; Shirley to Anderson, 16 miles; New Castle to Muncie, 20 miles; New Castle to Winchester, 28 miles; New Castle to Richmond, 26 miles; total, 140 miles.

INDIANA UNION TRACTION.—Proposed extension from Anderson, Ind., southeast to New Castle, about 20 miles; also from Anderson northwest to Elwood, 15 miles.

INDIAN CENTRAL.—Incorporated to build from Ponca, Okla., southeast to Paris, Tex., with a branch from the Red River northwest to Oklahoma City, a total of 460 miles, 120 miles of which will be in Oklahoma. Pleasant Porter, of Muscogee; E. T. Hathaway, O. D. Halsell, Ed. Overholser and William C. Reeves, of Oklahoma City, and the Sequoyah Development Co. are interested. Office at Oklahoma City.

*INDIAN CREEK & POUND RIVER.—Five-mile extension up north fork of Pound river is well under way. Proposed seven-mile extension from Pound, Va., south to coal and timber fields.

INTER-CALIFORNIA.—See Southern Pacific.

INTERIOR & WEST VIRGINIA.—See Norfolk & Western.

INTERSTATE (Electric).—Incorporated in Missouri to build from Kansas City north to St. Joseph, 47 miles. George R. Collins, Kansas City, interested.

INTERURBAN.—Incorporated to build from South Lebanon, Ohio, east to Morrow, five miles.

IOWA & NORTHWESTERN. — Incorporated to build 75 miles of railroad east from Waterloo, Iowa. Stephen B. Howard, President; E. M. Rice, Vice-President, and E. C. Luther, Secretary and Treasurer, all of New York.

IOWA CITY, MONTEZUMA & WESTERN (Electric).—Incorporated to build from Iowa City, Ia., west to Montezuma, 60 miles. E. B. Macey and L. H. Bufkin, of Lynnville; J. W. Carr, of Montezuma; F. O. Hardington, of York; P. S. Carson, of Iowa City, and M. C. Rohret, of Union, interested.

ITHACA & SENECA FALLS INTERURBAN.—Incorporated to build from Ithaca, N. Y., north to Seneca Falls, with branches from Willard to Ovid, and from Trumansburg to Mecklenburg, a total of 52½ miles. J. N. Hammond and T. J. Cary, Seneca Falls, and J. Rothschild, Ithaca, Directors.

J

JACKSON, PASCAGOULA & GULF.—Organized in Mississippi to build from Jackson southeast to Pascagoula, on the Gulf, 175 miles. F. A. Lewis, of Scranton, Miss.; Stone Deavours, of Laurel, and E. C. Jones, of Jackson, incorporators.

JACKSONVILLE, FERNANDINA & SOUTHERN.—Chartered to build from Jacksonville, Fla., northeast to Fernandina, 30 miles. Eugene E. West, President; John R. Young, Vice-President; Samuel A. Swan, Secretary, and Frank Adams, Treasurer. (Mar. 16, 1906.)

JACKSON, YAZOO CITY & MEMPHIS.—Organized to build from Vicksburg, Miss., to Memphis, 230 miles. I. N. Barnwell and E. S. Crane, of Yazoo City, incorporators. (Mar. 16, 1906.)

JAMESTOWN, DIAZ & CHERRY VALLEY.—Chartered to build from Jamestown, Ark., east to Cherry Valley, 65 miles. (Mar. 16, 1906.)

JASPER & EASTERN.—See Gulf, Colorado & Santa Fe.

JENNINGS & SOUTHWEST.—Organized to build from Lake Arthur, Calcasieu Parish, La., northwest to Jennings, thence north to point on the projected Colorado Southern, New Orleans & Pacific. S. L. Cary, Alba Heywood, O. W. Heywood, A. C. Wilkins, S. C. Morse, W. Krielow, E. P. Fox, George Hathaway and E. F. Rouson, Directors.

JOHNSON CITY, BAKERSVILLE & SOUTHERN.—Proposed line from Johnson City, Tenn., to Bakersfield, N. C., 40 miles; 8½ miles from Unicoi to Davisville, Tenn., was built four years ago. Surveys made from Davisville to Johnson City, 18½ miles. C. B. Allen, Johnson City, Vice-President. (March 16, 1906.)

JOHNSON CITY SOUTHERN.—See Southern.

JOHNSTOWN, EBENSBURG & NORTHERN.—Incorporated in Pennsylvania to build 25 miles of road in Cambria County. G. E. Daniels, Johnstown, Pa., President.

JOLIET & SOUTHERN TRACTION.—Franchises secured in Joliet for 10 miles of track to be used as entrances for interurban lines from Morris, Dwight and Blue Island; also for independent entrance for the Joliet, Plainfield & Aurora, which has been absorbed by the Joliet & Southern. H. A. Fisher, President; John M. Raymond, Vice-President; J. K. Newhall, Secretary; L. D. Fisher, Treasurer and Chief Engineer, Joliet, Ill.

K

KALAMAZOO, GULL LAKE & NORTHERN.—Incorporated to build from Kalamazoo, Mich., to Richland and Prairieville, with branch to Gull Lake, in all 20 miles. J. T. Upjohn, Kalamazoo; H. K. Whitney, S. O. Howes and A. A. McKay, all of Battle Creek; M. P. Huick, A. H. Brown and E. B. Hosmer, of Chicago, interested.

KANAWHA & WEST VIRGINIA.—Surveys being made for extension from Pond Gap, W. Va., to Sweet Springs, 140 miles.

KANSAS CITY & BELTON. — Incorporated to build from Kansas City, Mo., south to Belton, 20 miles. W. J. Bales, D. W. Scott, T. A. Gill, W. Withers and E. S. Yoeman, all of Kansas City and Belton, incorporators.

KANSAS CITY & EXCELSIOR SPRINGS.—Chartered to build from Kansas City, Mo., northeast to Excelsior Springs. W. J. Thurman, McKinney, Tex.; A. F. Martin, C. D. Pratt, J. Williams and Eugene G. Jaccard, of Kansas City, interested.

KANSAS CITY & SPRINGFIELD SOUTHERN.—Surveys made from Springfield, Mo., to Richards, 95 miles, and from Sylvania to Stockton, 18 miles. Office at 2975 Michigan avenue, Chicago.

KANSAS CITY, GALVESTON & MEXICO.—Chartered to build from Kansas City, Mo., to Port Progresso, state of Yucatan, Mex.; also branches from Wagoner and Sapulpa, Ind. T., west to Guthrie; from Dallas west to Fort Worth, and from Austin to Houston and Galveston. G. V. Pattison, H. W. Pentecost and N. D. McGiney, of Guthrie, incorporators. (Mar. 16, 1906.)

*KANSAS CITY, LAWTON & PACIFIC.—Incorporated in Oklahoma to build from Kansas City to San Diego, Cal., 1,600 miles. Contracts let to R. F. King, of Ada, and to W. T. Sherwin, of Paul's Valley, Ind. T., for building from Wagoner, Ind. T., southwest to Lawton, Okla., 250 miles, and from Wewoka, Ind. T., east to Dustin, 30 miles. E. A. Hill, Assistant General Manager, 401 Odd Fellows' Building, St. Louis, Mo.

*KANSAS CITY, MEXICO & ORIENT.—Building from Kansas City, Mo., via Wichita, Kan.; Fairview, Okla. T.; Sweetwater and Presidio, Tex., and Chihuahua, Minaca and El Fuerte, Mex., to Topolobampo, on the Pacific coast, in the state of Sinaloa, 1,659 miles. In operation for 409 miles. Grading completed on 383 miles more. The Chihuahua & Pacific, 122 miles, will be part of the line, leaving 1,128 miles of track still to be laid. Branch projected from San Angelo, Tex., to Del Rio, 180 miles. Contract let to the Union Construction Co. and the International Construction Co., both of Kansas City, for building 344 miles.

——*The Kansas City Outer Belt & Electric, which is to be the Kansas City (Mo.) terminal of the K. C., M. & O., has let contracts.

KANSAS CITY OUTER BELT & ELECTRIC.—See Kansas City, Mexico & Orient.

KANSAS CITY, NEVADA & SPRINGFIELD.—Proposed line from Kansas City, Mo., southeast to Springfield, 160 miles. Surveys. T. P. McDonough, President. (Mar. 16, 1906.)

*KANSAS CITY, OKLAHOMA & HOUSTON.—Grading in progress between Honey Grove, Tex., and the Red River, 22 miles. M. J. Smith, South McAlester, Ind. T., Chief Engineer. (Mar. 16, 1906.)

KANSAS CITY SOUTHERN. — Projected cut-off from Siloam Springs, Ark., along the Arkansas-Indian Territory boundary line, south to Cherokee Junction, Ind. T., thence paralleling the St. Louis, Iron Mountain & Southern to Fort Smith, and south through Sebastian and Scott counties, joining the old main line near Mena, Ark., in all 120 miles.

——The Hot Springs, Ouachita & Mena, chartered in Arkansas to build from Mena, Ark., east to Hot Springs, 70 miles.

KANSAS CITY TERMINAL CO.—Incorporated to build the new Union Passenger Station at Kansas City, Mo., and all the lines connected with it. John V. Hanna, Chief Engineer, Kansas City, Mo.

KANSAS CITY, TULSA & SOUTHWESTERN.—To build from Kansas City, Mo., to Wichita Falls, Tex. Surveys under way from Joplin, Mo., to Tulsa, Ind. T. W. H. Hendren, Tulsa, Ind. T., Chief Engineer. (Mar. 16, 1906.)

KANSAS CITY, TULSA, TEXAS & GULF.—Organized to build from Kansas City, Mo., to

Matagorda, Tex. D. B. Merry, Tulsa, Ind. T., Chief Engineer.

KANSAS SOUTHERN & GULF.—Proposed extension from Westmoreland, Kan., south to Alma, 35 miles. O. J. Collmann, Westmoreland, Kan., General Manager.

KENTUCKY & SOUTHEASTERN. — See Cincinnati, New Orleans & Texas Pacific.

*KENTUCKY & TENNESSEE.—Contracts let to C. B. Donaghy for extension from Yamacraw, Ky., six miles, toward Bellfam, 12 miles. Surveys to Bellfam.

*KENTUCKY MIDLAND.—Building from Central City, Ky., to Madisonville, 25 miles; five miles graded. M. M. Wheeler, Chief Engineer, Central City, Ky.

KENTUCKY NORTH & SOUTH.—Surveys under way from Fullerton, Ky., to Bristol, Tenn., 200 miles. R. G. Taylor, Fullerton, Ky.; L. E. Miles, Springfield, O.; A. T. Noe, Pittsburg, Pa.; J. P. Purdun, Portsmouth, Ohio, and C. H. Hoglen, Dayton, Ohio, incorporators.

KENTUCKY-VIRGINIA.—Proposed extension line to Clintwood, Va., 23 miles. Surveys made. Address J. A. Boyd, Wise, Va.

KEYSTONE AIR LINE (Electric).—Organized in Pennsylvania by Joseph Ramsey, Jr., and associates to build across the state of Pennsylvania as part of the New York, Pittsburg & Chicago Air Line, to be 810 miles long from New York via Pittsburg to Chicago. The projected Indiana, Clearfield & Eastern, to be 25 miles long in Indiana and Clearfield Counties; the Allentown, Tamaqua & Ashland, 50 miles, in Lehigh and Schuylkill Counties, and the Brush Creek & Crow's Run, 10 miles in Beaver County, have arranged to build extensions so that they will connect and form part of the through line.

KINGSPORT SOUTHERN.—Incorporated to build from Sinking Creek, Tenn., north to the Virginia state line, 20 miles. D. V. Mullens, A. P. Moore, A. B. Whitaker, J. A. Dickey and J. C. Anderson, of Bristol, Tenn., interested.

KNOXVILLE, SEVIERVILLE & NEWPORT.—Preliminary surveys on this line from Knoxville, Tenn., to Newport. J. Templeton, Knoxville, Tenn., President.

L

LAKE CHARLES NORTHERN.—Incorporated to build from Lake Charles, La., north to De Ridder, 50 miles. G. W. Nott, President.

LAKE ERIE & PITTSBURG.—See Lake Shore & Michigan Southern.

LAKE ERIE & SOUTHERN.—Incorporated to build from Cleveland, Ohio, south to Massillon, 60 miles. R. T. Wood, H. B. Camp, J. R. Zmunt, F. W. Green and H. McIntyre, Cleveland, incorporators.

*LAKE ERIE TERMINAL & SOUTHERN (Electric).—Contract let to the Terminal Traction Co., Cleveland, for building from Cleveland, Ohio, south to Akron, 35 miles; track laid for five miles. R. J. Wood, Cleveland, Chief Engineer.

*LAKE SHORE & MICHIGAN SOUTHERN.—The Lake Erie & Pittsburg is building an extension of the Pittsburg & Lake Erie from Youngstown, Ohio, to Lake Erie. Contract let to Carter Construction Co. from Mill Creek Junction, near Cleveland, southeast to Kent, 26 miles.
——*Four-tracking to be finished between Toledo and Chicago.
——*Contracts let for building the Franklin & Clearfield from Franklin, Pa., southeast to Brookville, 56 miles, to the Crary Construction Co., McNally Co., Ferguson Contracting Co., Mills Construction Co., King Bridge Co., and American Bridge Co.

LAKE SUPERIOR & SOUTHEASTERN.—See Wisconsin Central.

*LAKE SUPERIOR SOUTHERN.—Contracts let to D. E. Baxter & Co., Inc., New York, for this line from Madison, Wis., north to Huron Bay, Mich., 290 miles. M. C. Phillips, President; W. K. Rideout, Secretary and Treasurer; E. B. Priest, Chief Engineer, Oshkosh, Wis.

LANCASTER & NORTHERN.—Chartered to build 10 miles from Lancaster, Pa., south to Millway. H. G. Seip, President, Easton, Pa.

*LAS VEGAS & TONOPAH.—Contracts let to Deal Bros. & Mendenhall for extension from Rhyolite, Nev., north to Goldfield, 76 miles. Projected to Tonopah, 16 miles further.
——Proposed branch into the Greenwater mining district of Inyo County, Cal.

LAUREL RAILWAY.—Incorporated to build from Damascus, Va., south to the Virginia-Tennessee state line, five miles. E. A. Mock, President, Damascus.

LEE COUNTY.—See Chicago & North-Western.

LEHIGH & LAKE ERIE.—See Lehigh Valley.

*LEHIGH VALLEY.—Construction of the Lehigh & Lake Erie, a 10-mile terminal railroad in Buffalo, N. Y., under way. To be finished this year. Contracts for grading, masonry and bridge superstructures let to F. D. Hyde, of New York.

LEROY & SOUTHWESTERN.—Incorporated to build from Leroy, Ill., southwest to Waynesville, 25 miles. A. H. Shelby, President, Bloomington, Ill.

*LEWISTON & SOUTHEASTERN (Electric).—Contracts let to Schofield & Co., Philadelphia, for building from Lewiston, Idaho, south to Grangeville, with branch from Westlake east to Ilo, and thence south to Nezperce, a total of 135 miles. Grading under way. W. P. Wood, Chief Engineer, Lewiston, Idaho.

LEXINGTON & EASTERN.—Surveys for extension from Jackson, Ky., southeast to Hazard, 33 miles.

LIBERTY-WHITE.—Surveys for extensions from Hahnesville, Miss., east to Columbia, and from Liberty west to Natchez.

*LIMA & TOLEDO TRACTION.—Building extension from Leipsic, Ohio, north to Toledo, 40 miles.

LINVILLE RIVER.—Proposed extension from Saginaw, N. C., to Mortimer, 15 miles.

LIVE OAK & GULF.—See Florida Railway.

*LIVE OAK, PERRY & GULF.—Extension being built from Rigler creek, Fla., west 30 miles.

*LONG ISLAND.—Second track from Roslyn to Glen Cove, from Flushing to Port Washington and from Flushing to Whitestone Landing; also from Oakdale to Patchogue. Third and fourth track from Winfield to Jamaica, and double-track connection from Glendale Junction on the Montauk division to White Pot on the main line, and third track from Hollis to Brushville; all to be built this year.
——*New cut-off between Jamaica and Far Rockaway, seven miles, under construction.
——Electrification of the North Shore branch to Whitestone Landing and to Port Washington from Long Island City, and the line from Long Island City to Manhattan Beach is planned.

LORAIN & ASHLAND.—Surveys being made for extension from Wellington, Ohio, south to Loudonville, 39 miles. Address August Mordecai, Wellington, Ohio.

LORAIN & WEST VIRGINIA.—See Wabash.

*LOUISIANA & ARKANSAS.—Contracts let to M. Tansey, of Tioga, La., for extension from Tioga south to Pineville, opposite Alexandria, five miles.

*LOUISIANA & PINE BLUFF.—Incorporated to build from Huttig, Ark., to Wellington, 20 miles. Track laid for three miles, and contract for balance let to S. R. Neal, of Huttig, Ark. It is to cross the Iron Mountain near Huttig. (Mar. 16, 1906.)

*LOUISIANA EAST & WEST.—Extension from Ville Platte, La., to Eunice, 16 miles, graded; track-laying under way. C. J. Carpenter, Superintendent, Bunkie, La.

LOUISIANA RAILWAY & NAVIGATION CO.—Proposed branch from Hessamer, La., north to Marksville, seven miles.

LOUISVILLE & ATLANTIC.—Surveys for extension from Beattyville, Ky., east 50 miles.

*LOUISVILLE & EASTERN (Electric).—Building extension from Lakeland, Ky., east to Frankford, 46 miles; also branch from Shelbyville north to Newcastle, 16 miles.

LOUISVILLE & GREAT WESTERN TRACTION.—Surveyed from New Albany, Ind., to French Lick, 53 miles, and from New Albany to Corydon, 20 miles. J. C. Henderson, New Albany, Chief Engineer.

*LOUISVILLE & NASHVILLE.—Revision of line on the Henderson division between Greenbrier, Tenn., and Guthrie, Ky., 26 miles; 16 miles completed, the rest to be done this year.
——*On the Kentucky division the revision of line from Corbin, Ky., to Livingston, 41 miles, under way; 30 miles completed last year.
——*Work under way double-tracking and changing grades between Graces, Ala., and Hardy, 17 miles. Contract reported let to N. J. Oliver, Knoxville, Tenn.
——*Building branch from main line near Helena, Ala., into the Actin coal basin, six miles.
——The North Alabama extension of the Cane Creek branch from Vulcan, Ala., to Shelton Creek, 14 miles, will be built in 1907.
——A short line to the mine of the Lacey-Buck Iron Co., 2½ miles, to be built this year.
——Revision and double-tracking of main line between Oxmoor, Ala., and Helena, 9 miles.
——*Contract let to the Walton, Wilson & Rodes Co., of Knoxville, Tenn., to build the Madisonville, Hartford & Eastern from Madisonville, Ky., east and then north to Mitchell, 60 miles. George W. Feagin, Hartford, Ky., Chief Engineer of the M., H. & E.
——The Cumberland & Northern projected from Scottsville, Ky., northeast to Lebanon, Ky., 110 miles.
——Pine Mountain Railroad reported building from Williamsburg, Ky., east to Pineville, 35 miles.
——Surveys near Pineville, Ky., for line up right fork of Straight creek to coal fields, seven miles.
——The Bay Minette & Fort Morgan to be eventually extended from Foley, Ala., to Fort Morgan, 45 miles from Bay Minette. W. W. Olney, Bay Minette, Ala., Chief Engineer. (Mar. 16, 1906.)

LOUISVILLE, NEW ALBANY & CORYDON.—Proposed extension from Corydon Junction, Ind., east to New Albany, 20 miles.

LOUISVILLE, SOUTH PITTSBURG & BIRMINGHAM.—Incorporated to build from Louisville, Tenn., to Birmingham, Ala., 225 miles. C. H. Glatzan and E. Ripley, of Pittsburg; J. W. Davis, of Falconer, N. Y., and J. A. Shillito, of Crossville, Tenn., incorporators.

*LUXORA, JONESBORO & WESTERN.—Incorporated to build from Luxora, Ark., to Jonesboro, 45 miles. Contract for grading first 10 miles reported let to H. P. Liston, of Luxora, Kan. J. B. Driver, Luxora, President. (Mar. 16, 1906.)

M

MADISONVILLE, HARTFORD & EASTERN.—See Louisville & Nashville.

MADRAS & EASTERN.—Incorporated to build from Madras, Ore., east to Hay Creek coal mines and thence toward Port Ontario. W. H. Huston, Prineville, Ore., President.

MAINE & NEW HAMPSHIRE (Electric).—Organized to build from Standish, Me., south to Hollis, 10 miles. G. B. James, of Boston, President; E. E. Hastings, of Fryeburg, Me., Clerk, and A. C. Kennett, of Conway, N. H., Treasurer.

MALONE, FORT COVINGTON & HOPKINS POINT.—Incorporated to build from Malone, N. Y., north to a point in Province of Quebec, 18 miles. J. M. Cantwell and Lewis Mitchell, of Malone, incorporators.

MANGHAM & NORTHEASTERN.—Building extension from Mangham, La., to Baskinton, three miles. Address O. A. Wright, Mangham, La.

MANILA & SOUTHWESTERN.—Building with its own force from Lunsford, Ark., to Hancock, 12½ miles. Surveys under way from Hancock to Manila, 6½ miles further.

*MANILA RAILWAY.—Work has begun on the 400-mile railroad system which the syndicate formed by Speyer & Co., of New York, plans to build in the island of Luzon in the Philippine Islands. The syndicate agrees to build 428 miles in Luzon, including 100 miles in the provinces of Albay and Ambos Camarines, the line from Manila to Batanzas and Lucena with branches, and several branches from the existing line of the Manila & Dagupan, branching to the east and to the west and including a line from Dagupan to San Fernando de la Union, and a branch to the foot of the mountains near Bagnio.

MARIANNA, BRINKLEY & WESTERN.—Contracts were to be let late last year to build from Marianna, Ark., northwest to Brinkley, 28 miles. G. W. L. Brown, of Marianna, is General Manager.

MARION RAILROAD.—Incorporated to build from Fairmont, W. Va., north to Fairview, 100 miles. J. Y. Hamilton, J. Gregory and J. R. Thomas, Jr., of Fairview; James R. Lynn, F. H. Bailey and A. S. Fleming, of Fairmont, incorporators.

MARION & JOHNSTON CITY.—See Missouri Pacific.

MARIETTA & LAKE.—Projected from Jewett, Ohio, south to Marietta, 101 miles; surveys under way. Proposed extension from McCleary's southwest to Chillicothe, 100 miles. W. H. Young, Chicago, President, and R. S. Blinn, Mt. Vernon, Ohio, Chief Engineer.

MARLBORO & DEEPWATER.—Incorporated to build 12 miles in South Carolina. J. J. Matheson, President; G. D. Matheson, Vice-President, and C. R. May, Secretary and Treasurer.

MARLBOROUGH RAILROAD.—Incorporated in Michigan to build from the Pere Marquette to Marlborough, Lake County. C. B. Parsons, O. B. Taylor, W. S. Duncan, H. H. Parsons and Arthur Stansell, of Detroit, Directors.

MARSH FORK.—See Tidewater.

MASCOUTAH & BELLEVILLE (Electric).—Projected from Mascoutah, Ill., to Belleville, 11 miles. Peter W. Lill, Secretary, Mascoutah, Ill.

MASON & OCEANA.—Proposed change to standard gage of 27 miles, and extension from Walkerville, Mich., south to Grand Rapids.

MATTAWAMKEAG & NORTHERN.—Organized to build from Mattawamkeag, Me., northwest to Millinockett, 22 miles. F. A. Greenwood and A. Wetherby, of Lincoln, Me., interested.

*MAYFIELD & COLUMBUS.—Contracts reported let for this line from Mayfield, Ky., to Columbus, 30 miles. W. B. Sanfield, Chief Engineer, Mayfield, Ky.

*McCLOUD RIVER.—Building with its own forces a 25-mile extension.

MEMPHIS & NEW ORLEANS.—See St. Louis & San Francisco.

*MEMPHIS, PARIS & GULF.—Projected from Memphis, Tenn., via Little Rock, Ark., to Paris, Tex., 400 miles. Contract for grading two miles from Little Rock, Ark., let to J. F. Anders. J. W. Brown, Camden, Ark., President, and C. C. Henderson, Arkadelphia, General Manager.

MERIDIAN & TOMBIGBEE.—To build from Meridian, Miss., northwest to Philadelphia, 50 miles. Surveys. C. F. Woods, J. M. McBeath, A. D. McCraven, Frank Heiss, of Meridian, and Dr. J. P. Phillips interested.

*MICHIGAN CENTRAL. — Detroit River Tunnel Co. building the Michigan Central's new railroad tunnel under the Detroit river between Windsor, Ont., and Detroit, Mich. The length of the underground part of the tunnel will be 2.6 miles, and the distance from surface to surface about three miles. Contract let to the Butler Brothers, Hoff Co., of New York. Design "A" modified is being used. The contract calls for the completion of the work by June 1, 1909. See *Railroad Gazette* Feb. 16, 1906, p. 149, and Feb. 23, 1906, p. 184.

MIDDLESBORO MINERAL.—See Southern.

*MIDDLETOWN & CECILTON.—Building from Middletown, Del., via Warwick, Md., to Cecilton, Fredericktown and Georgetown, Md., 12 miles. Contracts let to W. R. Polk, Middletown, for nine miles; 7½ miles graded, but no track laid. Proposed branch from Cecilton to Bayview, seven miles. W. R. Polk, Wilmington, Del., General Manager.

MIDLAND VALLEY.—Proposed extension from Hoye, Tex., south to Texarkana, 150 miles.

MID-OREGON & EASTERN.—Incorporated to build from Portland, Ore., southeast through the Cascade mountains, then east to point on Snake river, 325 miles. C. H. Monroe, David Leppert and C. L. Tobias, incorporators.

MILLEN & SOUTHWESTERN.—See Georgia & Florida.

MILLTOWN AIR LINE.—Projected from Naylor, Ga., southwest to Valdosta, 15 miles.

MILWAUKEE & FOX RIVER (Electric).—Incorporated to build from Cedarburg, Wis., to Chilton; thence to Kaukauna and Appleton, 80 miles; also a branch southwest from Chilton to

Fond du Lac, 30 miles. J. M. Seaman, of Sheboygan; G. Bricknauer, J. B. Connell, H. W. Wilson, F. Phillips, A. J. Pullen, incorporators.

MILWAUKEE, PEORIA & ST. LOUIS.—Incorporated to build from Peoria, Ill., north to Rockford, 125 miles. (Mar. 16, 1906.)

MILWAUKEE, ROCKFORD & EASTERN.—See Illinois, Indiana & Gary.

MINERAL BELT.—Projected from Florence, Tenn., to Manning, 15 miles. T. H. Allen, Florence, interested.

MINIDOKA & SOUTHWESTERN.—See Oregon Short Line.

MINNEAPOLIS & GREAT NORTHERN.—See Great Northern.

*MINNEAPOLIS & RAINY RIVER.—Building an extension from Big Fork, Minn., 13 miles; further extension of 80 miles to International Falls projected.

*MINNEAPOLIS & ST. LOUIS.—Contracts let to Winston Bros. Co., of Minneapolis, for extending the Minnesota, Dakota & Pacific from Chelsea, S. Dak., to Le Beau, 83.42 miles.

MINNEAPOLIS & ST. PAUL SUBURBAN.—This subsidiary of the Twin City Rapid Transit Co. will extend several lines from Minneapolis, Minn., north and west.

*MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Building double-track line of its own into St. Paul from Soo Junction to Seventh and Kittson streets; includes 1,500-ft. tunnel under Great Northern and Northern Pacific tracks.

——*Contract reported let for preliminary work and grading on branch from Brooten, Minn., northeast to Duluth, 175 miles.

MINNESOTA & INTERNATIONAL.—See Northern Pacific.

MINNESOTA, DAKOTA & PACIFIC.—See Minneapolis & St. Louis.

MIONA SPRINGS.—To build from Fort Valley, Ga., west to Southland, 27 miles. J. R. Lane, C. B. Culpepper and A. O. Brewton, of Fort Valley, incorporaters. J. R. Lane, General Manager.

MISSISSIPPI & ALABAMA.—See Illinois Central.

*MISSISSIPPI CENTRAL.—Building from Hattiesburg, Miss., southeast 18 miles; track laid for 10 miles, and eight miles is under construction. Bowles & Hemingway, contractors.

——*Contracts let to the Worthington Construction Co., of Brookhaven, Miss., and the O. A. Gibson Construction Co., of Natchez, Miss., to build the Natchez & Eastern from Brookhaven, Miss., west to Natchez, 66 miles.

*MISSISSIPPI EASTERN.—Building five-mile extension from Camp, Miss.

MISSISSIPPI GARDEN.—To build from Hattiesburg, Miss., north to Carthage. G. A. Flater, of Toledo, Ohio; S. P. Floeter, of New Albany, Miss., and W. F. Floeter, of Taylorsville, Miss., incorporators.

*MISSISSIPPI ROADS.—W. Denny & Co. are building from Moss Point, Miss., north to Donavan, 40 miles; 19 miles completed.

——Application made to incorporate company to build from Gulfport, Miss., north to West Point, 220 miles.

*MISSOURI & NORTH ARKANSAS.—Formerly St. Louis & North Arkansas. Projected extensions from Seligman, Mo., northwest to Joplin, 50 miles, and from Leslie, Ark., southeast to Helena, 100 miles. Contracts let to M. C. Burke and L. S. Joseph, of Cape Girardeau, Mo., and Leslie, Ark., from Seligman to Nesho, 41½ miles, and to Scott & Dalhoff, of Nesho, from Leslie to Searcy, 96 miles.

*MISSOURI, ARKANSAS & SOUTHWESTERN.—Building from Batesville, Ark., northeast to Black Rock, 52 miles; 30 miles surveyed. B. I. Brookfield, Jonesville, Ark., Chief Engineer.

MISSOURI, IOWA & NEBRASKA.—Incorporated to build from Millard, Mo., northwest to Sioux City, Ia., 300 miles.

MISSOURI, KANSAS & TEXAS. — Surveys reported for a line from Wichita Falls, Tex., north to Lawton, Okla.

——Surveys reported for branch from Mineral, Kan., to Pittsburg. (Mar. 16, 1906.)

*MISSOURI, OKLAHOMA & GULF.—Contracts let for grading and bridge work to J. W. Hoffman & Co., of Kansas City, Mo., on an extension from Wagoner, Ind. T., north to Afton, 70 miles. Projected north to Pittsburg, Kan., with branch east to Joplin, Mo., from Henryetta west to Shawnee, Okla. T., 50 miles, from Dustin south to Denison, Tex., 128 miles.

MISSOURI PACIFIC.—Contracts let as follows:

——*On the Gurdon & Fort Smith Northern, from point near Caddo Gap, Ark., to near Black Springs, 9.62 miles, to the Dalhoff Construction Co., Little Rock, Ark.

——*Wabash Southern from five miles northeast of Zeigler, Ill., to Benton, 4.37 miles, to the J. A. Ware Construction Co., of St. Louis, Mo.

——*Marion & Johnston City from Marion, Ill., to Johnston City, 9.44 miles, to T. E. Newell, of Marion, Ill.

——*Springfield Southwestern between Crane, Mo., to Springfield, 34.36 miles, to the Willier Construction Co., of Springfield, Mo. Sub-contracts let to R. M. Bushman and A. M. Hanson, of Springfield, Mo., for 20-mile extension into Springfield.

——Proposed extension from Atchison, Kan., to St. Joseph, Mo. Land bought for terminal facilities. Not yet authorized.

——Surveys for branch from Joplin, Mo., southwest to Muskogee, Ind. T., 120 miles.

——Proposed cut-off from Lamar, Mo., northeasterly to the St. Louis-Kansas City line. Not authorized.

——*Contract let to Johnston & Grommet Bros. for new line of the St. Louis, Iron Mountain & Southern from Eudora, Ark., south to Gilbert, La., 78 miles; 37 miles built last year.

——Surveys reported by the St. Louis, Iron Mountain & Southern from Henson, Mo., south to the Mississippi River opposite Hickman, Ky., 25 miles.

——Surveys made by the Denver & Kansas Northern to build from Stockton, Kan., southwest to Scotts, 125 miles.

MISSOURI RIVER & GULF.—Incorporated at Topeka, Kan., to build from Kansas City to Denison, Tex., the northern terminus of the Houston & Texas Central, with branches to Shreveport, La., and Joplin, Mo. K. L. Browne, A. L. Berger, C. K. Wells, S. N. Prouty, B. R. Lane and W. Freeman, of Kansas City, Kan., directors. May be a Harriman project.

MOBILE & WEST ALABAMA.—Surveys made for a line from Mobile, Ala., to Florence, also a branch into Birmingham; 14 miles built last year.

MOBILE & WESTERN.—Extension projected from Mission Church, Ala., west to the Mississippi River.

MOHAWK VALLEY CO. (Electric).—See New York Central & Hudson River.

MOLINE, ROCK ISLAND & EASTERN TRACTION.—Incorporated by J. F. Porter, F. G. Young, J. F. Lardner, R. Casteel and D. F. Peck, of Rock Island, to build from Rock Island Ill., to Carbon Cliff; also from Rock Island south to Galesburg.

MONONGAHELA RAILROAD.—See Pennsylvania.

*MONTANA NORTHERN (Electric). — Projected from Basin, Mont., to Kalispell, 216 miles. Work under way on first 10 miles.

*MOREHEAD & NORTH FORK.—Contract let to the Snyder Construction Co. for line from Morehead, Ky., to Paragon, 10 miles. Subcontracts let to the Rinehart-Dennis Co., for three miles, including a 1,400-foot tunnel. Grading completed and three miles of track laid. E. W. Hess, Chief Engineer, Clearfield, Pa.

MORGANFIELD & ATLANTA.—Projected from Morganfield, Ky., south to Providence, 28 miles. Surveys and rights. T. B. Young, President, and W. W. Olney, Chief Engineer, Morganfield, Ky. (March 16, 1906.)

MORGANTOWN & DUNKARD VALLEY.—Proposed line from Morgantown, W. Va., to Mannington, 42 miles. W. W. Smith, Secretary, Morgantown, W. Va.

MORGANTOWN & PITTSBURG.—Incorporated to build 12 miles in Green County, Pa. W. P. Rainbow, of Pittsburg, President. P. G. McClelland, J. S. Weller, J. B. Chalfant, R. W. Martin and J. E. Sampson, Pittsburg, Directors.

MORGANTOWN & SOUTHERN (Electric).—Incorporated to build from Morgantown, W. Va., southwest to Fairmont, 28 miles. J. W. Wiles, President, and J. R. Johnson, Chief Engineer, both of Morgantown.

MUHLENBERG & EASTERN.—Incorporated to build from Central City, Ky., east to Rochester, 20 miles. G. T. Westerfield and T. O. Jones, Central City; W. F. Ennis, N. Murray and J. R. Drake, Bowling Green, incorporators.

MUNCIE & PORTLAND TRACTION.—Work under way on an extension from Portland, Ind., to Celina, O.

N

NACOGDOCHES & SOUTHEASTERN.—Proposed extension from Hayward, Tex., to Nacogdoches.

NAPA & VACA VALLEY. — To build from Vallejo, Cal., to Vacaville, 30 miles. E. H. Winship, H. M. Meacham and D. A. Dunlap, of Napa, incorporators.

NAPIERVILLE JUNCTION.—See Delaware & Hudson.

NASHVILLE & HUNTSVILLE (Electric).—To build from Nashville, Tenn., via Birmingham and Montgomery, Ala., to Pensacola, Fla. J. H. Connor, President.

NASHVILLE & VALDOSTA.—Organized to build from Valdosta, Ga., north to Nashville, 35 miles.

*NASHVILLE, CHATTANOOGA & ST. LOUIS.—Track laying under way on new yards near Atlanta, Ga.

——Cairo, Mayfield & Nashville to build from Murray, Ky., to Cairo, Ill., 60 miles.

NATCHEZ & EASTERN.—See Mississippi Central.

*NATCHEZ, COLUMBIA & MOBILE. — Building with own forces extension from Loweton, Miss., to Pearl river, 3½ miles.

NEBRASKA, KANSAS & SOUTHWESTERN.—Incorporated to build from Superior, Neb., southwest to Morton County, Kan., 300 miles. A. W. Wilson, H. C. Floyd, J. C. Hopper, C. H. Rassfield and R. D. McKinley, incorporators.

NEVADA-CALIFORNIA-OREGON.—Surveys being made for an extension from nine miles north of Madeline, Cal., to Alturas, Cal., 30 miles.

NEWCASTLE & NEW WILMINGTON.—Incorporated to build a 10-mile line in Lawrence County, Pa. J. H. Veazey, President; J. J. Ashenhurst, C. Freeman, C. E. Trainor and G. N. Nealy, New Wilmington, Directors.

*NEW JERSEY SHORT LINE (Electric).—Building from Milltown, N. J., to Elizabeth, 19 miles. Contracts let to the Schuylkill Stone Co., of Philadelphia, Pa., from Metuchen to Elizabeth, 10 miles grading half finished, but no track laid. Additional contracts shortly to be let. Richard I. D. Ashbridge, Weagel Building, New Brunswick, N. J., Chief Engineer.

NEW LONDON & EAST LYME STREET RAILWAY.—Proposed extension from Niantic, Conn., west to the Connecticut river, about 8 miles.

NEW ORLEANS & BATON ROUGE (Electric).—To build from New Orleans, La., northwest to Baton Rouge, 100 miles. W. O. Orton, C. S. Young, Edward Goodchaux, R. H. Himel and F. E. Lowe, incorporators.

NEW ORLEANS & NORTHERN MIDLAND.—Incorporated in Louisiana to build north to the Ohio river. H. O. True, Memphis, Tenn., President.

NEW ORLEANS, CROWLEY & WESTERN.—Incorporated to build from New Orleans to the Missouri, Kansas & Texas in Texas. W. F. Owen, President.

*NEW ORLEANS GREAT NORTHERN. — Contracts let to W. J. Oliver, of Knoxville, Tenn.; Smith & Scott, Memphis, Tenn.; the Worthington Construction Co., of Alabama; E. W. Hanlon, of New Orleans, La., and to Shea & Ford, Buffalo, N. Y., for building various sections of its line as follows: May's Creek, Miss., to Jackson, 84 miles; Lawrence Creek, La., to Tylertown, Miss., 23 miles, and Slidell, La., via Mandeville to Abita Springs, 26 miles.

NEW ORLEANS, NATCHEZ & PACIFIC.—Organized to build from Natchez, Miss., south to New Orleans, 160 miles. A. B. Wheeler, New Orleans, President; W. J. Poitevant, New Orleans, First Vice-President; R. F. Larned, Natchez, Treasurer, and C. E. Moritz, Natchez, Secretary.

*NEW RIVER, HOLSTON & WESTERN.—Contracts let to the Sale Construction Co., of Narrows, Va., for extension from Boxley, Va., to Day, two miles.

*NEWTON & NORTHWESTERN.—Contract let to J. G. White & Co., of New York, for electrifying this road from Newton, Ia., northwest to Rockwell City, 102 miles.

NEW YORK & PORTCHESTER.—See New York, Westchester & Boston.

NEW YORK & QUEENS COUNTY (Electric).—Proposed extensions to Bayside and Whitestone, Long Island, and eventually to Douglaston and Little Neck.

*NEW YORK, AUBURN & LANSING (Electric).—Grading finished on this line from Auburn, N. Y., to Ithaca, 39 miles. Track laid from Auburn to Genoa, 19 miles. H. A. Clarke, Chief Engineer, Wright avenue, Auburn, N. Y.

*NEW YORK CENTRAL & HUDSON RIVER.—Work in progress widening the line for four tracks at various points on the Hudson division, 27 miles. Grade crossing elimination and improvement at Yonkers has been approved by the Railroad Commissioners and is under way.

——*On Grand Central Station improvement the excavation of section No. 2 of the main yard west of the Lexington avenue yard begun.

——*Improvement work for large new Bronx station at 149th street, New York, in progress.

——Tracks in Tenth and Eleventh avenues, New York, to be removed from the surface of the streets. Not yet determined whether they will be elevated or depressed in a subway.

——Planning a two-track subway under West Fifty-third street, New York City, to connect the present Park avenue tunnel with the proposed subway under Eleventh avenue.

——*Large new yard at Gardenville, near Buffalo, N. Y. Work begun.

——*Electrification of 44 miles of the West Shore between Utica and Syracuse for joint interurban service by the Mohawk Valley Co. Nearly finished.

——Plans made for betterments on the Boston & Albany as follows: 14½ miles of third track between Pittsfield, Mass., and Albany, N. Y.; additional track at Charlton, Mass.; extension of third and fourth tracks from Lake Crossing, Mass., west to South Framingham, about five miles, and terminal improvements in Boston.

*NEW YORK, CHICAGO & ST. LOUIS.—Laying 50 miles of second track in Illinois, Indiana and Ohio.

NEW YORK CONNECTING.—See Pennsylvania.

*NEW YORK, NEW HAVEN & HARTFORD.—Harlem River branch from Harlem River to New Rochelle, N. Y., now double track, is being six-tracked. Contract let to Daly & Holbrook. Four tracks will be equipped electrically with the third-rail system. Estimated cost of the entire work on this branch, $7,701,891; $4,825,891 for the roadway and stations, and $2,286,000 for the electrical equipment and apparatus.

——*Electrification of line from Wakefield, N. Y., east to Stamford, Conn., nearly finished.

——*Further double-tracking of the Highland division from Danbury, Conn., east to Hawleyville 5.6 miles and from Waterbury, and rebuilding northeast to Bristol, 10 miles by the new line. Contract for first section let to Lathrop & Shea, of Brooklyn, N. Y. Waterbury to Bristol involves relocation of much of the line and a 3,500-foot tunnel at Pequabuck, Litchfield County. Work under way.

——*The Providence Terminal Co. is building a line from the main line station at Providence, R. I., under the river to East Providence, 2.70 miles. This includes a tunnel about two miles long and to cost $2,000,000, under the city.

——*Widening cut through the city of New Haven for four tracks, 1.65 miles. C. B. Blakeslee & Sons, of New Haven, have the contract.

——*New four-track bridge on the New York division at Naugatuck Junction. Nearly finished.

——Large improvements to be made to freight and steamship terminal facilities in Boston.

——The remaining 20 miles of the Providence division are to be four-tracked.

——The air line between New Haven and Willimantic, 54 miles, to be straightened and rebuilt.

——The Danbury & Portchester is to build a new double track cut-off from New York division near Greenwich, Conn., via Ridgefield, to

Highland division west of Danbury, 30 miles; will shorten distance between New York and Danbury 15 miles.

——Surveys made some time ago for cut-off from Plantsville, on the Northampton division, southeast to Yalesville on the Hartford division, eight miles.

——Authority asked for a line from present southern terminus of main line at Woodlawn, 12 miles north of New York, south along the east bank of the Bronx river, four miles, to connection with Harlem River & Portchester branch near West Farms, four miles north of Harlem River terminus.

——*The Consolidated Railway, building an extension of the Springfield & Eastern (Electric) from Monson to Fiskdale, 12 miles; and to South Monson, one-half mile.

——*Contract let by Consolidated Ry. to C. W. Blakesley & Sons, New Haven, Conn., to build the Naugatuck Valley (Electric) from Naugatuck, Conn., to Seymour, 8 miles; track laid for 5 miles.

——*Consolidated Ry. building electric roads from Waterbury, Conn., to Woodbury, 13 miles, and from Waterbury to Thomaston, 6 miles.

——See East Side Viaduct.

NEW YORK NORTHERN (Electric).—Organized to build from Watertown, N. Y., south to Oswego, 70 miles. F. P. Shines, President.

NEW YORK, PITTSBURG & CHICAGO AIR LINE (Electric).—See Keystone Air Line.

*NEW YORK SUBWAYS.—Subway to Brooklyn from the Battery, Manhattan, under the East river, and Joralemon and Fulton streets to the Flatbush avenue station of the Long Island R. R., Brooklyn. Work under way.

——Bids to be asked shortly for a four-track subway loop to connect the Brooklyn and Williamsburg bridges. Work will cost $5,245,000 and take three years.

*NEW YORK, WESTCHESTER & BOSTON (Electric).—Work under way from 177th street, New York, north to the city boundary, 4¼ miles. Contract let to James P. McDonald, 42 Broadway, New York City. Proposed line is from Harlem river at 129th street, north through West Farms, Westchester, Bay Chester, Pelham Manor, Pelham, New Rochelle, Larchmont, Mamaroneck, Harrison and Rye to Port Chester to the Connecticut line, with branch from Pelham through Mount Vernon, Alameda Park, Fairview Park, Tuckahoe, Arthur Manor and Scarsdale to White Plains, N. Y., in all 38 miles. The New York & Portchester, which has franchises over nearly same route, now controlled by same interests. William L. Bull, President, and William A. Pratt, Chief Engineer, 30 Broad street, New York.

NIAGARA PENINSULA.—Projected from Port Colborne, Ont., west to Welland. Rowell, Reid Wilkie, Wood and Gibson, of Toronto, solicitors.

NITANNY RAILROAD.—Incorporated to build from Cedar Springs, Pa., north to Millhall, four miles. W. C. Lingle, of Patton, President.

NORFOLK & CAROLINA COAST.—A syndicate represented by Rudolph Kleybolte & Co., of New York, has organized this company to build from Norfolk, Va., to Beaufort, N. C., with branches 200 miles. (Mar. 16, 1906.)

*NORFOLK & SOUTHERN.—Contracts let to H. H. George, Richmond, Va., and J. G. White & Co., of Wilson, N. C., and New York, for work in North Carolina, on the Norfolk & Southern, the Raleigh & Pamlico Sound, the Virginia & Carolina Coast, and the Atlantic & North Carolina, as follows: From Raleigh to Zebulon, 25 miles; Zebulon to New Bern, 105 miles; Farmville to Snow Hill, 10 miles, and Bayboro to Oriental, 10 miles; 53 miles of grading finished and 45 miles of track laid. Other contracts to be let soon for work from Mackay's Ferry to Edenton, 10 miles.

——*Contract let to J. A. Wilkinson to build cut-off from Bishop Cross west to Pinetown, 10 miles.

*NORFOLK & WASHINGTON AIR LINE.—Contract for construction and equipment of this line from Washington, D. C., to Esperanza, Md., 64 miles, let to D. E. Baxter & Co., Inc., New York. A. B. Linderman, Philadelphia, Pa., President.

NORFOLK & WESTERN.—This company has work under way to be completed during 1907 as follows:

——*The Virginia & Potts Creek, to be built from the terminus of the Interior & West Virginia to Potts Creek, Va., 11 miles.

——*The Interior & West Virginia, to be built from the terminus of extension of Big Stony through Monroe County, W. Va., to Virginia State line, 17½ miles.

——*The Big Stony, to be extended from Interior, Va., to West Virginia state line, six miles.

——*The Pocahontas & Western, to be extended 4½ miles up Laurel Creek in Virginia.

——Also double-tracking and revision of line is proposed between Walton, Va., and Pearisburg, 19 miles, including new tunnels; and between Vivian, W. Va., and Thacker, 50½ miles.

——*Contracts reported let for six tunnels aggregating 6,100 feet on the West Virginia division, to cost about $3,000,000, and be completed within three years.

NORTH & SOUTH TEXAS.—Contracts to be let for 34 miles from two miles north of Groveton, Tex., to Lufkin; also from Groveton to Oakhurst, 25 miles. Surveys from Oakhurst to Houston, 70 miles. McCarthy, Starnes & Co., Lufkin, Tex., interested.

NORTH ALABAMA.—See Louisville & Nashville.

NORTH CAROLINA & OHIO.—Organized to build from Raleigh, N. C., east to Washington, 90 miles. C. O. Haines and Adam Tredwell, of Virginia; John S. Cunningham, Steven C. Bragaw, L. J. Moore, C. M. Brown and W. Bragaw, of North Carolina, Directors. (Mar. 16, 1906.)

NORTH CAROLINA CONNECTING. — Incorporated to build from Springhope, N. C., northwest to Roxboro, 60 miles. D. W. Gunn, of Roanoke, La.; D. J. Nysewander and S. P. Douglas, of Toledo, Ohio; T. F. Whitlesey, of Mobile, Ala.; W. H. Hood and H. H. Hood, of Henderson, N. C., incorporators. (Mar. 16, 1906.)

NORTH COAST.—Projected from North Yakima, Wash., on the route of the St. Paul's Pacific extension west through Tieton Pass to Kosmos. Surveyed and part of right of way secured. Reported to be a St. Paul project. R. E. Strahorn, Spokane, President.

NORTH MISSISSIPPI & BAY SPRINGS.—To build from Burnsville, Miss., south to Itawamba County line, 30 miles. F. J. Ozanne and E. B. Causey, all of Memphis, Tenn., incorporators. (Mar. 16, 1906.)

*NORTH NEW MEXICO & GULF.—Building from Espanola, N. Mex., to Abiquin, 25 miles. Surveys under way for 10 miles additional from Abiquin. William H. Coe, of New York; E. B. Miller, of El Rito, N. Mex.; G. H. Howard, of Santa Fe; G. V. Howard, of Boulder; F. E. Coe, of Denver, Colo., incorporators.

NORTH RIVER.—Chartered in Virginia to build railroads. R. M. Gillespie, New York, President, and C. B. Williamson, Harrisonburg, Va., Secretary and Treasurer.

NORTH SHORE (Cuba).—Incorporated to build from a point on Mayanabo Bay, north of Nuevitas, in province of Puerto Principe, Cuba, west through Cubitas Valley to Caibarien, a port in province of Santa Clara, 250 miles; also a 50-mile branch from Senada to iron mines south of the Cubitas mountains. C. D. Gibbons, 106 Wall street, President.

NORTH SHORE & WESTERN (Electric).—To build from Elgin, Ill., west to Evanston, 35 miles. George P. Merrick, 100 Washington street, Chicago, Attorney. William C. McHenry, E. R. Fifer, George P. Merrick and William A. Love, of Chicago, incorporators.

*NORTH YAKIMA & VALLEY.—Contract let to Allen & Mathieson for grading part of this road through Naches Pass, in the Yakima Valley, Wash. George Donald, of North Yakima, interested. (Mar. 16, 1906.)

*NORTHEASTERN TEXAS.—Work under way on the remaining 40 miles of this road between Red Water, Tex., and Texarkana; 14 miles built from Red Water south to Daingerfield. G. Munz, Red Water, Tex., President, and R. E. Gray, Chief Engineer. (Mar. 16, 1906.)

*NORTHERN ELECTRIC. — Building extension from Marysville, Cal., to Sacramento, 30 miles; nearly finished.

——Extension surveyed from Red Bluff, Cal., north to Redding, 40 miles.

NORTHERN MICHIGAN.—Projected from St. Ignace, Mich., northeast to Sault Ste Marie, 49½ miles. A. S. Robinson, Sault Ste. Marie, Chief Engineer.

NORTHERN MICHIGAN (Electric). — Incorporated to build from Manistee, Mich., northeast to Cheboygan, 220 miles. Surveys under way. F. O. Olsen, of Traverse City, interested.

NORTHERN OF MAINE.—Projected from a point near Fort Kent, Me., southwest to the St. Johns and the St. Francis rivers, 25 miles; also east to Frenchville, Madawaska and Grant Isle, thence southeast to Van Buren, 35 miles. Arthur H. Lewis, Chicago; V. N. Therriault, Fort Kent; E. E. Goodrich, Waterville, and E. R. Michand, Frenchville, interested.

*NORTHERN PACIFIC.—Contract reported let to Doherty & Dempsey, of Bemidji, Minn., to extend the Minnesota & International from Big Falls northeast to International Falls, 37 miles.

——*Extension from Culdesac, Idaho, southeast to Grangeville, 55 miles; grading completed for 15 miles. Porter Brothers & Walsh, Spokane, Wash., reported to have the contract. Will be finished this year.

——Surveys reported from De Smet, Mont., to St. Regis, in the Cœur d'Alene country, 72 miles, to relocate the Cœur d'Alene branch.

——Proposed cut-off around Valley City, N. Dak., from Alta west to Berea.

——Location maps filed for branches, one from Mandan, N. Dak., south to the Standing Rock Indian reservation, 40 miles, the other from Mandan north, to point on Missouri river in Mercer County, near Mannhaven, 60 miles.

——*Work begun on the Port Townsend Southern from Quilcene, Wash., south to the N. P. main line, probably at Olympia.

——Proposed cut-off from Lind, Wash., west 100 miles to Ellensburg. (Mar. 16, 1906.)

——Extension of McHenry branch from McHenry, N. Dak., through Fort Totten Indian reservation to Oberlin, 40 miles. (Mar. 16, 1906.)

——Proposed extension from Turtle Lake, N. Dak., west to Coalharbor, McLean County, 24 miles. (Mar. 16, 1906.)

——See Oregon, Washington & Idaho under Oregon Railroad & Navigation Co.

——See Portland & Seattle.

NORTHWESTERN PACIFIC.—See Southern Pacific.

NORTHWESTERN RAILROAD. — See Oregon Short Line.

NORWAY & WESTERN.—Incorporated to build from Norway, Me., to East Stoneham; also from Norway to South Waterford, total 21 miles. J. Bartlett, of Stoneham; L. S. Burnham, of Albany, Me.; W. G. Rand, of Boston, Me.; F. H. Noyes, of Norway, and W. H. Kilgore, of North Waterford, Directors. (Mar. 16, 1906.)

NORWOOD & ST. LAWRENCE.—The Raymondville & Waddington incorporated to build an extension from Raymondville, N. Y., to Waddington, 15 miles.

*NUECES VALLEY, RIO GRANDE & MEXICO.—Building from Carrizo Springs, Tex., to Del Rio, 123 miles. Contract let to Ward & Lee, of Palestine, for first 20 miles. W. A. Squires, Carrizo Springs, Tex., General Manager. (Mar. 16, 1906.)

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OAK POINT & ELYRIA.—Incorporated with office at Elyria, Ohio, to build railroads. A. R. Mannering, E. S. Cooke and F. S. McGowan, incorporators.

*OCEAN SHORE (Electric).—Building double-track line from San Francisco, Cal., south to Santa Cruz, 83 miles. Contracts let to the Rialto Construction Co. from San Francisco to Ocean View, eight miles; to Willitt & Burr, the Ransome Construction Co. and Mahoney Bros. from Ocean View to Mussel Rock, 4¾ miles; to the Ransome Construction Co., Lewis Moring and Antonelli & Bandman from Mussel Rock to San Pedro Mountain, 8 miles; to the Ransome Construction Co., from San Pedro Mountain to Wadse Beach, 41 miles, and to Shattuck & Desmond and Pratchner & Chadwick from Wadse Beach to Santa Cruz, 21 miles. Grading all finished. Track laid for 22 miles. Steam to be used for freight service. J. Downey Harvey, President; Burke Corbet, Secretary; J. B. Rogers, Chief Engineer, San Francisco.

——The San Joaquin Valley Western reported incorporated to build extension from Santa Cruz, Cal., east via Holester toward Fresno, 40 miles.

——The Ocean Shore & Eastern incorporated to build a branch from Santa Cruz, Cal., southeast to Watsonville, 20 miles.

——The Pascadero Railway & Improvement Co. is to build a branch from the Ocean Shore up Pascadero Creek, Cal., eight miles. John B. Rogers, Chief Engineer of the Ocean Grove, is an incorporator.

OCEAN SHORE & EASTERN.—See Ocean Shore.

*OCILLA & VALDOSTA.—Extension from Ocilla, Ga., south to Allapaha, 17 miles. Six miles graded.

OCONEE COUNTY.—Organized to build from Westminster, S. C., south to Fair Play, 12 miles. W. P. Anderson and William Bibb, of Westminster; A. W. Shelor, of Walhalla; J. J. Halley and L. A. Edwards, of Oakway; J. R. Heller, of Fair Play, and J. W. Shirley, of Townville, incorporators. (Mar. 16, 1906.)

OHIO & LICKING VALLEY.—Surveyed from Cannel City, Ky., northwest to Hillsboro, Fleming County, 72 miles.

OHIO RIVER & COLUMBUS.—Proposed extension from Ripley, Ohio, to Maysville, Ky., 10 miles. (Mar. 16, 1906.)

OHIO RIVER & GULF.—Projected from Johnson Stand, Tenn., north to Jamestown, 34 miles; surveys made. William Cooper, Maryland, Tenn., President; J. E. Jones, Monterey, Tenn., Secretary and Treasurer; Major R. J. Moscrep, Maryland, Tenn., Engineer. (Mar. 16, 1906.)

OHIO RIVER NORTHERN.—Chartered to build from East Liverpool, Ohio, to Lisbon, 21 miles. P. F. Smith, Pittsburg; John C. Wallace, Alfred T. Kelley, J. N. Vodrey, G. W. Clark and D. M. McLane, incorporators. (Mar. 16, 1906.)

OKLAHOMA & CANADIAN RIVER.—To build from El Reno, Okla., northwest to Meade, Kan., 245 miles. E. E. Blake, H. B. Low and C. O. Blake, of El Reno, and P. E. Walker and M. A. Low, of Topeka, incorporators.

*OKLAHOMA & CHEROKEE CENTRAL. — Contract let to Maney Bros., Oklahoma City, for building first 14 miles from Chelsea, Okla., toward the Verdegris river. Eventually to be extended to Pryor Creek. G. M. Green and C. R. Havighorst, of Guthrie, interested. (Mar. 16, 1906.)

*OKLAHOMA & NORTHWESTERN. — Proposed line from Elk City, Okla., to point in Beaver County, 100 miles. Grading begun from Doxey northwest on 75 miles. E. E. Niess, 171 La Salle street, Chicago, President; Henry Jarvis & Co., Chicago, Engineers. (Mar. 16, 1906.)

OKLAHOMA & TEXAS.—Incorporated to build from Oklahoma City to Wichita Falls, Tex., 200 miles. Surveys made, G. B. Stone, Oklahoma City. (Mar. 16, 1906.)

*OKLAHOMA CENTRAL.—Contracts let for extension from Purcell, Ind. T., west to Chickasha, 42 miles. Surveys made from Lehigh southeast to Paris, Tex., 86 miles. F. C. Hand, Chief Engineer of Construction, Purcell.

OKLAHOMA CITY & SHAWNEE TRACTION.—To build from Oklahoma City, Okla., southeast to Shawnee, 40 miles. Sherman Collins, Ithaca, N. Y.; O. P. Wortman, W. F. Young, of Oklahoma City; W. H. Crane and Samuel Ketchum, of Adrian, Mich., incorporators.

OKLAHOMA NORTHERN. — To build from Thomas, Okla., northwest to Taloga, 35 miles. A. A. Patterson, of Benton Harbor, Mich.; C. D. Nichols, of Oklahoma City; F. L. Black, of Taloga, incorporators.

OKLAHOMA, TEXAS & GULF.—Incorporated to build from Clarendon, Tex., through Oklahoma to Hope, Ark., 350 miles. Charles M. Meeker, President, 50 Broadway, New York. F. B. Wildman, of Blair, Okla.; E. A. Williams, of Roosevelt, Okla.; C. A. Huber, of Weatherford, Okla.; R. K. Wooten, of Chickasha, Ind. T.; J. W. Buchanan, of Van Buren, Ark.; R. Burge, Felix P. Both and L. B. Comer, all of Fort Worth, interested.

*OKLAHOMA, TEXAS & WESTERN.—Contract let to build from Clinton, Okla., northwest to Cheyenne, 20 miles. L. L. Collins, A. C. Miller, L. W. Pate and R. V. Converse, of Cheyenne, and D. D. Fitzgerald, of New York, Directors.

OMAHA & DENVER SHORT LINE.—Incorporated to build from Denver, Colo., east to Omaha, Neb., 500 miles. Offices in Denver and New York. C. M. Allaire, C. S. Devere, D. B. Ellis, C. L. Horton, P. Robinson, Samuel F. Rathvon, Secretary and Treasurer of the United Oil Co.; Frederick R. Ross and George A. H. Fraser, the last three of Denver, are interested.

OMAHA & NEBRASKA CENTRAL (Electric).—Projected from Omaha, Neb., to Hastings, 200 miles.

OPELOUSAS, GULF & NORTH EASTERN.—See Texas & Pacific.

ORANGE & KEYSVILLE.—Projected from Dillwyn, Va., south to Keysville, 40 miles. Surveys made and grading finished for 10 miles. R. T. Hubard, Dillwyn, Va., President.

OREGON & EUREKA.—Projected extension from Luffenholtz, Cal., north 18 miles.
——Grading to be begun on extension of the Little River spur in California from Camp 15 to Camp 17—three miles.

OREGON & SOUTHEASTERN.—Projected extension from mile post 20, in Oregon, to Bonita, seven miles.

OREGON & WASHINGTON.—See Oregon Railroad & Navigation Co.

OREGON EASTERN.—See Southern Pacific.

*OREGON ELECTRIC.—Contracts let to W. S. Barstow & Co., of New York and Portland, for building this line from Portland, Ore., to Salem, 50 miles; eight miles built.

*OREGON RAILROAD & NAVIGATION CO.—The Oregon, Washington & Idaho is being built by the O. R. & N. and Northern Pacific jointly from Texas Ferry, Wash., opposite Riparia, east to Lewiston, Idaho, 72.3 miles. To be finished this year.
——*Building from St. John's, Ore. (near Portland) east 20 miles to main line near Troutdale, to form second line between Troutdale and Portland; part graded.
——*Contract let to Erickson & Peterson, of Portland, Ore., for extending the Ilwaco Railway & Navigation Co.'s line from Ilwaco, Wash., west 14 miles; projected three miles further to Knappton.
——*Contract let to Erickson & Peterson for 47 miles from Elgin, Ore., to Joseph, 63 miles.
——The Oregon & Washington, incorporated to build from Portland, Ore., north to Puget Sound, about 230 miles. Surveys made to Tacoma.
——The Umatillo Central, located from Pendleton, Ore., to Pilot Rock, 14 miles.
——Proposed extension of the Columbia Southern from Shaniko, Ore., south 50 miles. (Mar. 16, 1906.)

*OREGON SHORT LINE.—Contract let to Utah Construction Co., Ogden, Utah., to extend the Yellowstone Park Railroad from mile post 40, 23½ miles north of Marysville, Idaho, to west side of Yellowstone National Park, 46½ miles.
——*Contracts let to Corey Bros. Construction Co., Ogden, Utah, to extend the Minidoka & Southwestern from Twin Falls, Idaho, to Buhl, 15 miles. Graded for three miles; two miles of track laid. Projected ten miles further to point on Salmon river.
——*Contracts let to Utah Construction Co., Ogden, Utah, to build the Northwestern Railroad from Blakes Spur north to Homestead, 58 miles; includes 2,200-ft. tunnel east of Huntington, Ore.
——*Contract let to Utah Construction Co., Ogden Utah, for spur from Tecoma, Nev., southeast to mine of Salt Lake Copper Co., 4.27 miles.
——Proposed 30-mile extension from Kemmerer, Wyo., north to coal fields.

OREGON, WASHINGTON & IDAHO.—See Oregon Railroad & Navigation Co.

OREGON WESTERN.—See Southern Pacific.

ORGAN MOUNTAIN.—Chartered to build from El Paso, Tex., to mining districts in New Mexico, 75 miles. N. D. Streeter, of Philadelphia; Adrien A. Jones, of Las Vegas, N. Mex.; Harris Walthall, D. Y. Hadley, S. A. S. Cox, A. M. Walthall, H. W. Fall, W. S. Crombie, Dan M. Jackson, J. W. Eubank, all of El Paso, incorporators.

*OSCEOLA, LITTLE RIVER & WESTERN.—Building from Osceola, Ark., west to Little River, 15 miles; 5½ miles built. J. E. Roberts, Osceola, Chief Engineer.

OTSELIC VALLEY.—To build from South Otselic, N. Y., northeast to Georgetown, 12 miles. B. F. Gladding, M. K. Perkins, D. W. Crumb, E. J. Stack and R. R. Brown, all of South Otselic, Directors.

OVERTON COUNTY.—May extend from Livingston, Tenn., north to Burnside, Ky., 60 miles.

OZARK & CHEROKEE CENTRAL.—See St. Louis & San Francisco.

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PACIFIC & EASTERN. — To build from South Bend, Wash., east to Chehalis, 45 miles. W. S Cram and H. G. Shoemaker, South Bend, and T. H. Donovan, Raymond, Wash., incorporators.

PACIFIC & IDAHO NORTHERN.—Surveys made for extension from Evergreen, Idaho, to Meadows, 16 miles.

*PACIFIC RAILWAY & NAVIGATION CO.—Building extension from mile post 20 west to Tillamook, Ore., 69 miles; also branch from mile post 20 north to Vernonia, 13½ miles. Surveys north and south of Tillamook for line from Astoria south along the coast to Newport, 110 miles.

PADUCAH SOUTHERN.—To build from Paducah, Ky., northeast to Hickman, 50 miles. D. A. Archer, promoter. B. H. Scott, H. H. Loving, W. A. Martin and B. Weille, of Paducah, interested.

PARAGOULD & MEMPHIS.—Proposed extensions: Cardwell north to Poplar Bluff, Mo., 50 miles; Cardwell west to Paragould, 12 miles; Manila southwest to Marked Tree, 30 miles, and Manila southeast to Osceola, 16 miles.

PARIS & MT. STERLING (Electric).—Incorporated to build from Paris, Ky., southeast to Mt. Sterling, 25 miles. H. A. Powers, R. J. Neely, of Paris; J. T. Collins, of Middletown; H. C. McKee and J. M. Bigstaff, of Mt. Sterling, interested.

PARIS, DEPORT & SOUTHEASTERN.—Organized to build from Paris, Tex., to Rosalie. R. F. Scott, President; George I. Terrell, First Vice-President; J. G. Wright, Second Vice-President; W. H. Grayson, Third Vice-President; C. I. Broad, Treasurer, and J. J. Dickerson, Secretary. (Mar. 16, 1906.)

PARKERSBURG BRIDGE & TERMINAL.—Surveyed from Johnson, W. Va., west to Little Hocking, Ohio, 11 miles. Rights of way secured. S. D. Brady, Parkersburg, W. Va., Chief Engineer.

PASCADERO RAILWAY & IMPROVEMENT CO.—See Ocean Shore.

PATAPSCO & SUSQUEHANNA.—See Baltimore & Ohio.

PAULS VALLEY.—Chartered to build from Ada, Ind., southwest to Wichita Falls, Tex. J. C. Amendt, Chicago, President; W. M. Freeman, Vice-President; Albert Kennie, Secretary and Treasurer; J. B. Thompson, S. J. Garwin and J. C. Hybarger, of Pauls Valley, and A. P. Williams, John Upshaw and P. J. Stovall, of Wanetta, Directors. (Mar. 16, 1906.)

PAYETTE VALLEY.—Extension to be built from New Plymouth, Idaho, to Emmett, 15 miles.

PEACH RIVER & GULF.—Extension from Midline, Tex., southeast to Beaumont, 65 miles; also from Timber northwest; 10 miles built last year.

PEA RIVER VALLEY & GULF.—Projected from Opelika, Ala., southwest to Portland, Fla., 200 miles. (Mar. 16, 1906.)

PEARL RIVER VALLEY.—Projected from Jackson, Miss., to Birmingham, Ala., 270 miles. Grading to be begun soon. Fred Herrick, Milwaukee, Wis., President; A. J. Wenjell, Chief Engineer; C. F. Lattimer, Vice-President; Arthur L. Hogue, Secretary, and Roy L. Hogue, Treasurer, all of Biloxi, Miss.

PELHAM & FLORIDA.—To build from Pelham, Ga., to Havana, Fla., 40 miles. J. B. Martin, J. F. Lewis, R. Black, J. Lane, W. T. Banburg, H. C. Briggs, of Valdosta; C. H. Butler, of Calvary; H. A. Sanders, of Whigham; C. J. Stevens, of Milltown, and W. L. Perkins, of Jennings, Fla., incorporators.

PELHAM, BAINBRIDGE & GULF.—To build from Pelham, Ga., southwest to Fairchilds, 52 miles. J. W. Everett and J. L. Hand, of Pelham, incorporators. (Mar. 16, 1906.)

PENINSULA (Electric). — To build from San José, Cal., to San Francisco, with branch to Los Gatos. O. A. Hale, F. E. Chapin, G. Lyon, W. C. Andrews and A. E. Wilder, Directors.

*PENNSYLVANIA. — Terminal improvements at New York being carried out by the Pennsylvania, New Jersey & New York Railroad west from center of the Hudson river, and east of that point by the Pennsylvania, New York & Long Island. New York Contracting Co. has contract for excavation of site for terminal station, which is about finished, and foundation work begun. Same company has contract for western approach between Eleventh avenue and Ninth avenue. Contract for construction of the terminal station building, and all electrical equipment and for the entire terminal and approaches let to Westinghouse, Church, Kerr & Co. Other work in connection under way as mentioned in following six paragraphs:
——*New line from Harrison, N. J., the point east of Newark where the tunnel line leaves the present main line, to the Weehawken shaft of the Hudson river tunnel. Most of the bridges built; the one over the Hackensack river is nearly finished. Work being carried on from both ends and from a shaft in the center by William Bradley & Son, contractors, on two single-track tunnels under Bergen Hill. Excavation on tunnels and approaches well under way.
——*Two single-track tube tunnels from Weehawken under Hudson river to Eleventh avenue shafts; tubes completed and concrete lining being put in. O'Rourke Engineering Construction Co., contractors.
——*Tunnels under Thirty-second and Thirty-third streets, New York, from terminal station at Seventh avenue to East river. United Engineering & Contracting Co., contractors. About two-thirds finished; excavated from East river to point west of Fifth avenue.
——*Four single track tubes under the East river from Manhattan shaft to a point on the Long Island side. Excavation and lining about one-fourth finished. S. Pearson & Son, Ltd., contractors.
——*Tube tunnels from river shaft east under Long Island City nearly completed. S. Pearson & Son, Ltd., contractors.
——*Tunneling under streets in Long Island City to Sunnyside yard; about two-thirds finished.
——*Franchise granted to the New York Connecting Railroad to operate a belt line through Brooklyn and Queens Boroughs, New York City and over the East river to a connection with the New York, New Haven & Hartford at Port Morris, on the Harlem river. This is to be accomplished by building a line from Manhattan Junction on the Long Island Railroad to the East river, and by a bridge over the East river and Wards and Randalls islands, with a connection at Long Island City to the Long Island Railroad terminal yards. The line is to include on its south end through Brooklyn the Bay Ridge line of the Long Island Railroad from East New York to Bay Ridge, on which improvements are under way to eliminate 115 street grade crossings at a cost of about $7,000,000.
——*Permission granted the New York Connecting to build a large terminal to be known as the Sunnyside yard between Jackson and Thompson avenues, Long Island City. To be over one mile long, average nearly one-third of a mile wide, and include about 400 acres. Contracts to be let shortly.
——*At Greenville, N. J., the work of dredging the channel and filling in the yard is being continued.
——*The Pennsylvania & Newark is building a new freight line from West Morrisville, Pa., to Newark, N. J., 50 miles. With its completion the six-track system will extend from Trenton to Jersey City. Work includes new bridge across the Delaware river from Trenton, N. J., to Morrisville.
——*Work under way on new yard at West Morrisville, Pa., the junction of the Pennsylvania & Newark with New York division. To be about 50 miles of track. John T. Dyer Co., contractor.
——*Work on the four-track system on the Middle division completed between Granville, Pa., and Mayes. Work is being pushed revising alinement between Vandyke and Port Royal and between Ryde and a point west of Mount Union. The latter involves heavy cutting, and two new stone arch bridges over the Juniata river.
——*On the Pittsburg division work being pushed to finish four-track system between Sang Hollow and Bolivar, requiring a change of line and two stone arch bridges over the Conemaugh river; also between Beatty and Southwest Junction. The contracts are as follows: For grading and masonry from Sang Hollow, Pa., to Seward, to H. S. Kerbaugh (Inc.), Philadelphia; from Seward to N F tower, at New Florence, to McMemanin & Sims, Philadelphia; from that point to the coke ovens east of Lock port (to include changing the course of the Conemaugh) to the Eyre Construction Co., of Philadelphia, and from the coke ovens to Bolivar, to Thomas F. Kerns & Son, of Pittsville. This work covers about 16 miles.
——*On the West Pennsylvania division, the line between Blairsville and Tunnelton, and the Sang Hollow extension are being revised and double-tracked, and some important changes made at other points.
——*Building extension of Monongahela division from West Brownsville, Pa., south 4½ miles to connection with Pennsylvania, Monongahela & Southern, under construction up valley of Monongahela river to Rice's Landing, 7½ miles.
——*Contract reported let to D. F. Keenan, of Philadelphia, for an extension of the Monongahela & Washington division from Ellsworth to point on Daniel's Run, 10 miles; 1,000,000 cu. yds. of earth excavation and building 70,000 cu. yds. of concrete masonry.
——*Double-track tunnel under Capitol Hill from Philadelphia, Baltimore & Washington to new union station at Washington, D. C. Nearly finished.
——*Contract for work on the Philadelphia, Baltimore & Washington in connection with the Washington improvements let to the Drake & Stratton Co., of Philadelphia. Includes the Maryland avenue subway from Ninth to Water streets, and delivery yards at Sixth, Ninth and Water streets. Excavation work started. Will involve shifting tracks and building temporary tracks and roadways for street traffic. A roadbed for the southern trains will also be provided. Will be one under grade and three overhead bridges.
——*Contract let to John A. Kelley Co. for grading, masonry and track-laying on proposed cut-off on the West Jersey & Seashore, from a point on the Cape May division, north of Westville, east to connection with the Delaware River bridge line near West Haddonfield Junction five miles. The contract includes changing Delaware river bridge tracks in West Haddonfield.
——Proposed freight line over the Susquehanna river at Sunbury, Pa., and down the west side of the river to connection with the yards at Selinsgrove and Enola.
——Proposed freight line from Glen Loch, Pa., south of the main line to city limits of Philadelphia at Cobbs Creek between Coleman avenue and Woodbine street, thence to Fifty-sixth street, 20 miles. Considerable right of way secured.
——Proposed new yards at Buffalo and a line to connect the Buffalo & Allegheny Valley division with the Western New York & Pennsylvania. Cost estimated at $500,000.
——Proposed double-tracking of the Philadelphia & Erie division from Wilkesbarre to Sunbury, 64 miles.
——Surveys made for extending the Turtle Creek branch, which runs from Stewart, Pa., on the Pittsburg division, northeast to Export, 10.4 miles, and east to Blairsville, on the West Pennsylvania division, 18 miles. (Mar. 16, 1906.)
——*Agreement with city authorities of Philadelphia for elevation of tracks from Venango street to Norris street. From Venango to Cambria street a retaining wall will be built, and from Cambria street to Norris street a steel viaduct. The Philadelphia & Reading tracks will pass underneath at Trenton avenue near Lehigh avenue. Cost estimated at $1,500,000, of which the city will pay $750,000. (Mar. 16, 1906.)

PENNSYLVANIA & NEWARK.—See Pennsylvania.

PENNSYLVANIA LINES WEST.—Work under way as follows:

——*On the Southwest system, completion of second track on the Logansport division from Logansport to Chicago, and track elevation work at Indianapolis and Cincinnati.

——On the Northwest system double-tracking of Cleveland & Pittsburg from Steubenville, O., to Bellaire, 25 miles. Some right of way purchased.

——*Work to be carried on by the Pennsylvania Co. during 1907 includes the track elevation in Cleveland between Superior avenue and Central avenue, 8,000 feet, and provides for the construction of nine subways; also elimination of grade crossing at Kinsman street by construction of a steel viaduct. Not yet under contract.

——*Work of elevating tracks in Chicago between South Park avenue and Stony Island avenue will be finished.

——*A new double-track lift bridge will be built at Indiana Harbor, Ind. Contracts for superstructure and substructure awarded.

——Proposed cut-off from Smiths Ferry, Pa., through Columbiana County, Ohio, to connection with P., F. W. & C. east of Alliance, Ohio, 40 miles.

——Proposed new yard at North Hammond, Ind., to accommodate 1,000 cars.

——Reported that the Pittsburg tunnel of the P., C., C. & St. L. will be bored through to Daylight and made 150 ft. wide.

——The Chartiers Southern incorporated in Pennsylvania to build through Cecil, North and South Strabane, Somerset and West Bethlehem Townships in Washington County, 18 miles. E. B. Taylor, 3d V. P. Pa. Lines West, President.

——The Pennsylvania Western to build from Red Bank Junction, Pa., to Enon, 60 miles. Surveys. (Mar. 16, 1906.)

PENNSYLVANIA, NEW JERSEY & NEW YORK.—See Pennsylvania.

PENNSYLVANIA, NEW YORK & LONG ISLAND.—See Pennsylvania.

PENNSYLVANIA WESTERN.—See Pennsylvania Lines West.

PENOBSCOT BAY.—To build from Rockland, Me., north 30 miles. M. S. Bird, E. S. Bird and H. I. Hix, of Rockland; H. L. Shepard, of Rockport; A. Pierce, of Frankfort; C. Wood, of Camden, incorporators.

PENSACOLA & NORTHEASTERN. — To build from Andalusia, Ala., southwest to Pensacola, Fla., 100 miles. F. C. Brent, J. S. Avery, C. M. Covington, S. B. Milligan and C. W. Lamar, all of Pensacola, incorporators. (Mar. 16, 1906.)

PEORIA, BLOOMINGTON & CHAMPAIGN (Electric).—Proposed line between Peoria, Ill., and Bloomington. The McKinley syndicate interested.

PEORIA RAILWAY TERMINAL. — Incorporated to build from Peoria, Ill., south to point in Tazewell County. T. A. Grier, F. H. Smith, H. F. Seele and William J. Jack, of Peoria, and W. J. Conzelman, of Pekin, Directors.

PERTH AMBOY & STATEN ISLAND (Electric).—Organized to build from Richmond, S. I., to Tottenville, and operate ferry to Perth Amboy. Office at New Brunswick, N. J. F. W. Schnitz, E. White, M. F. Reiff and H. Lowerself, of New York; E. Biesenbach, of Newark, and J. W. Humphreys, of New York, incorporators.

PHILADELPHIA & READING.—Agreement made with the city officials of Philadelphia to elevate tracks.

——Proposed electrification of the Atlantic City line from Philadelphia to Atlantic City, 57 miles.

——Surveys under way for better line between Pottsville, Pa., and Shamokin. Would shorten line from Clinton to Sunbury by 15 miles. (Mar. 16, 1906.)

PHILADELPHIA & SCHUYLKILL VALLEY. — Chartered to build from Mill Road, Pa., to Bridgeport, 15 miles. Loren N. Downs, Bryn Mawr, President; W. Robinson Molinaird, W. Evans Smith, George A. Chrisman, Ernest S. Chrisman, William Darling and William H. Ford, of Philadelphia, Directors. (Mar. 16, 1906.)

PHILADELPHIA, BALTIMORE & WASHINGTON.—See Pennsylvania.

PHILADELPHIA, CAMDEN & INTER-CITY LINK.—Proposed tunnel under the Delaware river from the foot of Walnut street, Philadelphia, to Delaware avenue, Camden, N. J.

PHILADELPHIA, NORRISTOWN & NORTHERN. —To build from Villa Nova, Pa., north to Norristown, 8½ miles, with branch from West Onocoheague. Morris Bernheimer, President. G. B. Staples, E. H. Weeks, I. Pratt, C. H. Richardson, S. E. Staples and W. S. Huntington, all of Philadelphia, Directors.

*PHILADELPHIA RAPID TRANSIT.—Extension of three years granted for completion of the Market street subway. Contract let to E. E. Smith Contracting Co. for extension of the Market street subway from present terminus at Fifteenth street around the City Hall and eastward to Juniper street. Contract let to Millard Construction Co. for eastern section of Market street subway, extending under Market street from City Hall loop to Front street. Work on both contracts under way.

*PHILIPPINE RAILWAY.—Work under way by the Philippine Railway Construction Co., which has let contract to J. G. White & Co., New York, to build 300 miles of road on the islands of Negros, Panay and Cebu, P. I. Equipment ordered and partly delivered. William Salomon, Chairman, and Charles M. Swift, President, New York.

PHILIPSBURG RAILROAD. — To build from Chester Hill, Pa., to Jaynesville, 18 miles. David F. Kreb, Clearfield, President.

PIERRE & FORT PIERRE BRIDGE & RAILWAY CO.—See Chicago & North-Western.

PIERRE, RAPID CITY & NORTH-WESTERN.—See Chicago & North-Western.

PINAR DEL RIO NORTHERN.—Incorporated to build railroads in Cuba. F. H. Morrill, President, and F. R. Barrett, Treasurer, both of Portland, Me.

PINE BLUFF & SOUTHERN.—Chartered to build from Pine Bluff, Ark., to Star City, Mo. S. C. Alexander, W. H. Langford and R. G. Atkinson, of Pine Bluff, Ark., Directors. (Mar. 16, 1906.)

PINE MOUNTAIN.—See Louisville & Nashville.

PINEVILLE & NORTHERN. — Incorporated to build from Pineville, Mo., northeast to Monett, 40 miles. John A. Sturges, Adair W. Noel and E. E. Coffee, of Pineville, interested. (Mar. 16, 1906.)

PITTSBURG & LAKE ERIE.—See Lake Erie & Pittsburg under Lake Shore & Michigan Southern.

PITTSBURG & NORTHEASTERN.—See Buffalo & Susquehanna.

PITTSBURG & TUBE CITY.—Organized to build a terminal road between Pittsburg and McKeesport. Charles S. Cameron, promoter, and former Senator Lee, Counsel.

*PITTSBURG, BINGHAMTON & EASTERN.—Building from Binghamton, N. Y., to Clearfield, Pa., 225 miles. Contracts let to Holbrook, Cabot & Rollins Corporation, Boston, to build from Powell, Pa., to Cedar Ledge, 21 miles. E. H. Gay & Co., Boston, financial agents. Thomas H. Watkins, Scranton, Pa., President; H. A. Schwanecke, Canton, Pa., Chief Engineer.

PITTSBURG, CONNELLSVILLE & WHEELING. —Projected from Wheeling, W. Va., to Masontown, Pa., 60 miles. A. A. Franzheim, of Wheeling, interested.

*PITTSBURG, HARMONY, BUTLER & NEW CASTLE.—To build from Allegheny, Pa., through New Castle to Butler. Contracts reported let. S. C. Vickers, E. L. Balsinger, T. G. Hamilton, C. C. Gerber and H. Ethridge, incorporators.

*PITTSBURG, SHAWMUT & NORTHERN.—The Brookville & Mahoning, projected from Hydes, Pa., southwest toward Pittsburg to Freeport, 101 miles. Contract let to Miller Construction Co., of Lockhaven, Pa., from Hydes southwest to Knoxdale, 36 miles. Contracts from Knoxdale to Freeport, 65 miles, to be let this year. W. W. Henshey, Chief Engineer, Brookville.

PITTSBURG SUBWAY.—Organized by Murray M. Verner and William B. Hayes, to build a subway to cost $10,000,000, from Oliver avenue and Smithfield street to Center avenue near Luna Park.

*PITTSBURG, SUMMERVILLE & CLARION.—Millcreek branch being extended from Millcreek, Pa., 10 miles by A. Cook's Sons Co., to connect with lumber properties. Three miles built.

PITTSBURG, WESTMORELAND & SOMERSET. —Proposed extension from Somerset, Pa., south to Meyersdale, 20 miles.

PLANT CITY, ARCADIA & GULF.—See Seaboard Air Line.

POCAHONTAS & WESTERN.—See Norfolk & Western.

POINT JUDITH.—Organized to build from Narragansett Pier, R. I., to Point Judith, 4 miles. Jeremiah Robinson, of New York, and Wakefield, R. I., President; Frank P. Sturges, Vice-President, and Isaac R. Robinson, Secretary and Treasurer, both of New York.

PORT ANGELES & OLYMPIA.—See Northern Pacific.

PORT ANGELES PENINSULA.—See Northern Pacific.

*PORT ARTHUR & HOUSTON SHORT LINE.—To build from Port Arthur to Houston, Tex., 85 miles. Contract let to H. S. Best, of Port Arthur, Tex., for 40 miles. F. J. Hart, 507 Missouri Trust Building, St. Louis, Mo., President. (Mar. 16, 1906.)

PORTLAND & NORTHERN (Electric). — Organized to build from Cumberland Mills, Me., to Bridgton, 38 miles. S. O. Hancock and R. Cook, of Casco; E. N. Mason, of Raymond; E. B. Jillson, Otisfield, interested.

PORTLAND & RUMFORD FALLS.—Projected extension from Rumford Junction, Me., south to Portland, 30 miles.

*PORTLAND & SEATTLE.—A joint project of the Northern Pacific and Great Northern to give them a direct low-grade line to Portland, Ore. Building from Portland up the north bank of the Columbia river to point 24 miles east of Pasco, whence connection projected to Spokane, and east along the Snake river to Texas Ferry, Wash., the eastern terminus of the Oregon, Washington & Idaho, which is being built jointly by the Northern Pacific and the Oregon Railroad & Navigation. From Portland to a point 17 miles east of Vancouver, Wash., and from Kennewick, opposite Pasco, to point 23 miles west will be double track, making 47 miles of double track, in which are included double-track steel bridges over the Columbia and Willamette rivers. Maximum grade eastbound, 11 ft. to the mile from Vancouver east to Texas ferry and 22 ft. to the mile on Spokane extension. The Portland & Seattle building 423 miles in all. Line from Portland to Texas Ferry to be finished by autumn and the Spokane extension early in 1908. Contract let to Siems & Shields, St. Paul, Minn., from Portland east to Kennewick, 230 miles. N. D. Miller, Chief Engineer, Vancouver, Wash.

PORTLAND & SOUTHWESTERN. — Incorporated to build from Scappoose, Ore., to Nehalem Bay. H. G. Platt and G. J. Perkins, of Portland, incorporators. (Mar. 16, 1906.)

*PORTLAND, NEHALEM & TILLAMOOK.—To build from Portland, Ore., west to Tillamook County. Contract let to the Atlas Construction & Supply Co., of San Francisco, for laying track on 20 miles. Other contracts let to Clark & Dixon, of Forest Grove, for clearing the right of way, and to Thompson Bros., for grading first three miles from Hillsboro. (Mar. 16, 1906.)

PORTLAND TERMINAL.—Projected line from Portland, Ore., to the Tualatin river, 20 miles. Address J. T. Burkhart, Portland, Ore.

PORT TOWNSEND SOUTHERN.—See Northern Pacific.

POUND GAP-ELKHORN.—To build a 25-mile line from Pound Gap, Ky., near the Kentucky-Virginia state line. C. T. Smith and G. W. Morehead, of Elkhorn City; W. Mercuria and J. Day, of Hellier, Ky., incorporators.

POWELLS VALLEY.—Surveys being made by James R. Russell, of Blackwood, Va., for a line from Blackwood up Powells river, 12 miles.

PRESCOTT & NORTHWESTERN.—Surveys being made from four miles west of Amity, Ark., to point near Kirby, eight miles.

PROVIDENCE TERMINAL CO.—See New York, New Haven & Hartford.

*PUYALLUP VALLEY NORTHERN (Electric).——Contracts reported let to the Engineering Construction Co., of New York, to build from Tacoma, Wash., east to Puyallup, nine miles. Fred. J. Chamberlain, of Puyallup, President; L. A. Nicholson, Tacoma, Chief Engineer.

R

RALEIGH & CHARLESTON.—Proposed extension from Lumberton, N. C., north to Fayetteville, 30 miles.

RALEIGH & PAMLICO SOUND.—See Norfolk & Southern.

RALEIGH & WESTERN.—Surveys being made for extension from Cumnock, N. C., to Greensboro, 50 miles.

RANDOLPH & CUMBERLAND.—Incorporated by E. V. Shedd and M. E. Caldwell, of Aberdeen, N. C., and T. J. Edwards, of Providence, R. I., to build from Fayette, N. C., northwest 117 miles, along Deep river, through Cumberland, Moore, Randolph and Guilford Counties.

RAYMONDVILLE & WADDINGTON.—See Norwood & St. Lawrence.

*RICHMOND & CHESAPEAKE BAY (Electric).—Building from Richmond, Va., north to Ashland, 15 miles; 9 miles built. Contract let to Phillips & Allport, Richmond, Va., for two miles, and John T. Wilson, Richmond, Va., for reinforced concrete viaduct 2,800 ft. long in Richmond. Projected extension from Ashland to Toppohannock, 42 miles. C. P. E. Burgwyn, Chief Engineer, Richmond, Va.

RIO GRANDE WESTERN.—See Denver & Rio Grande.

ROANOKE & NORTHERN.—Incorporated in Virginia to build railroads. L. H. Vaughan, President; J. P. Wood, Vice-President; W. P. Huff, Secretary, and J. L. Vaughan, Treasurer, all of Roanoke, Va.

ROANOKE & SALEM TRACTION.—Incorporated to build from Roanoke, Va., west to Salem, 10 miles. O. L. Stearnes, President; Charles D. Denit, Vice-President; W. B. Dillard, Treasurer; W. H. Tinsley, Secretary; R. W. Kime, General Manager, all of Salem.

ROCHELLE & WESTERN.—To build from Rochelle, La., northwest to Winnfield, 20 miles; also from Rochelle east to Harrisonburg, 35 miles. Headquarters at Monroe. C. H. Denkelman, J. C. Simpson, N. S. Cutright and E. T. Lamkin, incorporators. (Mar. 16, 1906.)

ROCHESTER, CORNING & ELMIRA TRACTION. —Incorporated by the Rochester Southern Construction Co., to build from Rochester, N. Y., southeast to Elmira, 120 miles. W. C. Gray and S. Fuerstein, 20 Exchange street, Rochester, Engineers. M. H. Schultz, C. O. Greer, H. G. Abel, F. Eckstein and F. S. Breckingham, of New York, Directors. Office, 42 Broadway, New York.

ROCHESTER, SYRACUSE & EASTERN (Electric).—Proposed extension from Lyons, N. Y., to Syracuse, 50 miles. Lyman C. Smith, Syracuse, President.

ROCKFORD RAILROAD.—Incorporated to build a belt line in Rockford, Ill. B. F. Lee, A. F. Humburg, S. F. Andrews, C. E. Foreich and W. E. Claflin, of Chicago, incorporators.

ROCK ISLAND, ARKANSAS & LOUISIANA.—See Chicago, Rock Island & Pacific.

ROCK ISLAND-FRISCO TERMINAL.—Organized by Rock Island-Frisco officers to build a terminal railroad in St. Louis; also in St. Clair County, Ill., and a line on the east bank of the Mississippi river near East Carondelet, 30 miles.

ROCKLAND, JASPER & NORTH-WESTERN.—Chartered to build from Rockland, Tex., east to Jasper, 25 miles. W. W. Kyle, S. K. Stone and W. W. Cunningham, of Beaumont, incorporators. (Mar. 16, 1906.)

ROCKPORT, LANGDON & NORTHERN.—Proposed extension from Rockport, Mo., north to Shenandoah, Iowa, 30 miles. Preliminary surveys.

*ROGERS SOUTHWESTERN.—Contract let to W. R. Felher Construction Co., and work under way on this line from Rogers, Ark., to either Gentry or Siloam Springs, Ark., 30 miles. W. R. Felher, of Rogers, Ark., President. (Mar 16, 1906.)

ROODHOUSE & VIRDEN (Electric).—Projected line from Roodhouse, Ill., east to Virden, 32 miles. C. W. Payne, Roodhouse, Secretary.

*ROSCOE, SNYDER & PACIFIC.—Projected from

Roscoe, Tex., northwest to New Mexico line, 200 miles. Contracts for grading 30 miles let to Col. N. T. Reed, Armour, Tex. Contracts for rails let. F. W. James, Abilene, President, and Martin Duval, Roscoe, Chief Engineer.

ROSWELL & EASTERN.—To build from Torrance, N. Mex., south to Texas boundary. K. S. Woodruff, C. W. DeFrees, R. F. Barnett, George T. Veal and W. Wells, all of Roswell, incorporators.

S

SACRAMENTO & VALLEJO. — Incorporated to build from Sacramento, Cal., southwest to Vallejo, 60 miles. W. Knight and B. Pringle, of Sausalito, and William G. Barr, of San Francisco, interested.

SACRAMENTO BELT.—Organized to build a belt line along the river levee on the city front of Sacramento, Cal.

SACRAMENTO SOUTHERN.—See Southern Pacific.

SACRAMENTO VALLEY & EASTERN.—Projected from Kennett, Cal., to Squaw creek, thence 16 miles to copper mines. F. J. Dearborn, Winthrop, Cal., Chief Engineer.

SAGINAW, OWOSSO & LANSING (Electric).—Projected from Lansing, Mich., northeast to Saginaw. J. A. Thick, of Detroit, interested.

ST. JOSEPH & GRAND ISLAND.—Bids asked on branch from Stouts, Kan., north to Highland, seven miles.

ST. JOSEPH & NODAWAY VALLEY.—To build from St. Joseph, Mo., north to Graham, 35 miles. W. C. Wilson, T. E. Denny, A. C. Snyder and T. E. Fleming, incorporators.

ST. JOSEPH & SOUTHERN.—To build from St. Joseph, Mo., to Kansas City. John Donovan, John D. Richardson, N. D. Biles, Edward C. Smith, James N. Burns, Henry Krug, Jr., J. G. Schneider and Jesse T. Roberts, all of St. Joseph, incorporators.

ST. JOSEPH, ALBANY & DES MOINES.—Proposed line from St. Joseph, Mo., northeast to Des Moines, Iowa, 200 miles. F. C. Mordaunt, Chicago, President. (Mar. 16, 1906.)

ST. JOSEPH, SAVANNAH & NORTHERN.—Incorporated with office at St. Joseph, Mo., to build from St. Joseph north to Savannah, 15 miles. T. B. Campbell, M. Tootle, F. J. Wheeler, of St. Joseph, incorporators.

ST. JOSEPH VALLEY TRACTION.—Proposed extension from Middlebury, Ind., west to Elkhart or southwest to Goshen, each about 12 miles.

ST. LOUIS & NORTHERN ARKANSAS.—See Missouri & North Arkansas.

ST. LOUIS & OKLAHOMA SOUTHERN.—To build from Pineville, McDonald County, Mo., southeast 20 miles. I. E. Sturges, J. N. Christensen, O. St. John, A. W. Noel and C. D. Dennett, of Pineville, interested; office at Pineville.

ST. LOUIS & SAN FRANCISCO.—Surveys from Paris, Tex., to point south of Palestine, 140 miles.
——Proposed new low-grade freight line from St. Louis, Mo., south to New Orleans, La. Surveys made.
——The Frisco, Oklahoma & Texas to build from Oklahoma City, Okla., south to Hewitt, Ind. T., thence east to Ardmore, 100 miles.
——*The Bonnerville & Southwestern has finished surveys and obtained right of way from Bonnerville, Ark., to Jelks, 65 miles. Contracts let to the Frisco Construction Co. Address J. F. Hinckley, St. Louis, Mo.
——*Contract reported let to McCade & Steen, of Irving, to build cut-off from Carrollton, Tex., to Irving, 11 miles.
——The Memphis & New Orleans, chartered to build from Marion, Ark., to the Louisiana state line, 180 miles.
——Proposed branch from Dublin, Tex., north to Thurber, 50 miles, and from Dublin south to Lampasas, 100 miles.
——Projected extension from Brady, Tex., south to San Antonio, 150 miles.
——Surveys to extend the Arkansas Valley & Western from Avard, Okla., west into coal field in New Mexico.
——See Colorado Southern, New Orleans & Pacific.

ST. LOUIS, BARTLESVILLE & PACIFIC.—To build from Joplin, Mo., west across the Indian Territory and Oklahoma to Pond Creek, Okla., about 240 miles. Office at Ponca City, Okla. T. G. B. Keller, J. L. Overlees, F. M. Overlees, J. J. Curl and H. J. Holm, of Bartlesville; M. Cunyon and W. L. Barnum, of Ponca City; C. Steckler and J. W. Bird, of Pond Creek, incorporators.

ST. LOUIS BELT & TERMINAL.—Proposed extension to the St. Louis & San Francisco, two miles. B. C. Jackson, Chief Engineer, St. Louis, Mo.

ST. LOUIS, BROWNSVILLE & MEXICO.—Proposed extension from Robstown, Tex., northwest to San Antonio, 125 miles.
——Surveys made last year from northern terminus, Algoa, Tex., east to Galveston and north to Houston.
——Proposed bridge from Brownsville, Tex., over the Rio Grande river to Matamoras, Mex., and eventually an extension south along the east coast of Mexico to Tampico, 300 miles.

*ST. LOUIS, DECATUR & CHAMPAIGN (Electric). — Contract let from Champaign, Ill., southwest to Litchfield, 125 miles. W. D. McKinley, President, and W. H. Tarrant, Chief Engineer, both of Champaign.

ST. LOUIS, EL RENO & WESTERN.—Proposed extensions from Guthrie, Okla., north to Peru Junction, Kan., 120 miles, and from El Reno southwest to near Hobart, 75 miles.

ST. LOUIS, ENID & SAN DIEGO.—Organized by residents of Guthrie, Okla., to build northeast and southwest from that place.

*ST. LOUIS, HILLSBORO & SOUTHERN (Electric).—Contract reported let for building from St. Louis, Mo., southwest to Hillsboro, 50 miles. R. E. Williams, President, and H. D. Brandt, Secretary, of St. Louis; J. Winer, Treasurer, of Hillsboro, and H. M. Bower, General Manager.

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—See Missouri Pacific.

*ST. LOUIS, LAKEWOOD & GRANT PARK (Electric).—Building from the terminus of the Southampton line of the United Railways Co. in St. Louis to the Grant farm.

ST. LOUIS SOUTHWESTERN.—Work to be carried out this year includes:
*Ballasting from Mt. Pleasant, Tex., to Fort Worth, 155 miles.
*Completion of improvements under way between Texarkana and Mt. Pleasant, Tex.
*Completion of bridge over the Red river and new freight yards near Shreveport, La.
*Laying 75-lb. rails on Shreveport branch and on main line between Tyler, Tex., and Waco.
——Proposed extension from Gatesville, Tex., to Hamilton. Surveys made some time ago for 33 miles. (Mar. 16, 1906.)

ST. LOUIS, SPRINGFIELD & OKLAHOMA WESTERN.—To build from Lawton, Okla., east to Sulphur, Ind. T., thence northeast through McAlester and Stigler to Sallisaw, 225 miles. G. S. Stocker, of Sallisaw; W. T. Douglas, R. Downing and A. D. Goodnough, of Sulphur; J. D. Jennings and J. J. Beall, of Oklahoma City, incorporators.

ST. LOUIS, VANDALIA, TERRE HAUTE & EASTERN TRACTION.—Projected from Terre Haute, Ill., to Dexter, 80 miles; surveys. P. Chase, Decatur, Ill., interested.

ST. LOUIS, WEBSTER & VALLEY PARK.—Projected from West End Heights, Mo., southwest to Valley Park, 15 miles.

ST. MARYS & WESTERN.—Projected from Johnsonburg, Pa., to Benezette, 25 miles; 10 miles built. E. L. Willard, St. Marys, is Chief Engineer. (Mar. 16, 1906.)

ST. PAUL & DES MOINES.—See Des Moines, Iowa Falls & Northern.

SALEM-MEHAMA (Electric). — Projected from Salem, Ore., southeast to Mehama, 24 miles. Financed by A. Welch, of Portland. Surveys and rights of way secured by Walters Bros., Salem.

SALEM, SPRINGFIELD & PEORIA.—To build from the Chicago & Eastern Illinois north to Peoria, Ill., 200 miles. E. H. Sennef, A. N. Trueb, J. W. Duck, F. W. Krohn and Jonathan Proves, all of Chicago, incorporators.

SALINA & NORTHWESTERN. — Projected from Salina, Kan., northwest to Logan County, Nebr., 250 miles. Preliminary surveys. George H. Whitcomb, President; J. W. Going, Vice-President, and C. Hamilton, Secretary, Topeka, Kan.

*SALT LAKE & OGDEN.—Building with its own forces an extension from the Davis-Weber County line to Ogden, 5½ miles; also from Ogden to Ogden Canyon, 2½ miles. Grading about finished.

SAN DIEGO & ARIZONA.—Under this name the San Diego Eastern, sold to J. D. Spreckels, is to build from San Diego, Cal., east to the Colorado river, 200 miles.

SAN DIEGO EASTERN.—See San Diego & Arizona.

SANDUSKY, FREMONT & SOUTHERN.—To build from Sandusky, Ohio, southwest to Fremont, 30 miles. G. H. Kelly, M. G. McAlleman, T. H. Hogsett, H. H. Johnson and George C. Ford, incorporators.

*SAN FRANCISCO, IDAHO & MONTANA.—Projected from Butte, Mont., to San Francisco, with branch from Caldwell, Idaho, to Winnemucca, Nev. Under contract from Caldwell to Homedale, 16 miles. Surveys being made from Homedale, Idaho, to Winnemucca, 180 miles. Donald Grant, Faribault, Minn., President. I. H. Richardson, Caldwell, Idaho, Chief Engineer.

SANGAMON VALLEY.—Incorporated to build from Decatur, Ill., west to Quincy, 150 miles, with branches at Springfield and Petersburg. G. M. Skelly, J. E. Melick, J. S. Sutton and C. F. Morrow, of Springfield, interested. (Mar. 16, 1906.)

SAN JOAQUIN VALLEY WESTERN.—See Ocean Shore.

SAN MARCOS VALLEY INTERURBAN.—Chartered to build from San Marcos, Tex., to Luling, 24 miles. A. T. Fisher, St. Louis, Mo., President; George W. Megrew, Houston, Tex., Chief Engineer. (Mar. 16, 1906.)

*SAN PEDRO, LOS ANGELES & SALT LAKE.—Contract let to Deal Brothers & Mendenhall Construction Co., Springville, Utah, to build the Caliente & Pioche from Caliente, Nev., north to Pioche, 32 miles. Graded some years ago for 29 miles.
——Final surveys for branch from Tintic Junction, Utah, west to Deep Creek, Nev., 115 miles; eventually to be extended southwest from Deep Creek to Ely, Nev., 60 miles.

SAN SABA VALLEY.—To build from Antelope Gap, Tex., west to Crothers, 50 miles. Surveys for 20 miles. W. S. Haywood, Jefferson, Tex., Chief Engineer.

*SANTA FE, LIBERAL & ENGLEWOOD.—Work under way on this line through New Mexico, Kansas and Oklahoma, consisting of four sections, first two of which already completed. First, the Santa Fe, Raton & Eastern, from Raton, N. Mex., east to Carisbrooke, 16 miles, with two branches running north into the coal fields of Colfax County; second, the Santa Fe, Raton & Des Moines, from Carisbrooke, N. Mex., east to Des Moines, 40 miles; third, the Santa Fe, Liberal & Englewood proper from Des Moines east via Hooker, Okla., to Woodward; fourth, the Canadian River, to run from Woodward, Okla., southeast to Watonga, from which point there are to be two lines, one to Guthrie and the other to Oklahoma City. Jesse G. Northcutt, Raton, N. Mex., President.

SANTA FE, RATON & DES MOINES.—See Santa Fe, Liberal & Englewood.

SANTA FE, RATON & EASTERN.—See Santa Fe, Liberal & Englewood.

SANTA ROSA & NORTHERN (Electric). — To build from Santa Rosa, Cal., to Healdsburg, and thence up Dry Creek Valley. W. A. Cattell, E. T. McMurray, J. H. Sanford, W. G. Taylor and P. S. Scales, all of San Francisco, incorporators.

SAVANNAH, AUGUSTA & NORTHERN.—To build from Savannah, Ga., northwest to Rossville, 330 miles, with branch from McDuffie County east to Augusta, 30 miles. J. A. Brennan, J. R. Miller, R. F. Donaldson, E. B. Sorrier, S. L. Moore, of Bulloch County, Ga., and E. M. Rice, of New York, incorporators.

SAVANNAH, STATESBORO & WESTERN.—To build from Statesboro, Ga., northwest to Atlanta, 210 miles. J. R. Anderson, T. F. Walsh, Jr., and W. E. O'Connor, of Savannah, incorporators.

SCHENECTADY & MARGARETSVILLE. — See Delaware & Eastern.

SEABOARD AIR LINE. — Extension authorized from Jacksonville, Ala., to Anniston, 20 miles.
——Several short lines to mines in Calhoun County, Ala.
——*Contract let to Blair Burwell, of Jacksonville, for building part of extension from Wacissa, Fla., southeast to Perry, 80 miles; 11 miles built last year.
——Surveys reported for a branch from Odenville, St. Clair County, Ala., northeast via Asheville to Gadsden, 32 miles. (Mar. 16, 1906.)
——*Contract let to Davis & Bushnell, of Manatee and Plant City, Fla., on the Plant City, Arcadia & Gulf from Welcome, Fla., south to Chicora, 10 miles.
——Projected from Chicora south to Arcadia, 35 miles.

SEABOARD TRACTION.—Organized to build from Smithfield, Va., to Manchester, opposite Richmond. L. R. Britt, Norfolk, President, and W. H. Robinson, General Manager. (Mar. 16, 1906.)

SEBASTICOOK & MOOSEHEAD.—Proposed extension north from Mainstream, Me., to connect with the Canadian Pacific, and south from Pittsfield to Albion on the Wiscassett, Waterville & Farmington, in all about 75 miles.

*SEWARD PENINSULA.—Organized last year to build from Nome, Alaska, to Kaugarok, 125 miles; building from Nome to Lanes Landing, 69 miles. C. L. Morris, Nome, contractor. Next work from Lanes Landing to mines, 30 miles. J. W. Dickson, 40 Pine street, New York, interested.

SHAWNEETOWN & WESTERN.—To build from Shawneetown, Ill., southwest to the Ohio river, 55 miles. John Gilbert, H. B. Pierce, J. L. Murphy and W. H. Moore, all of Golconda, and Charles E. Turner, of New York, incorporators. (Mar. 16, 1906.)

*SHELBY COUNTY.—Building from Shelbyville, Mo., south to Shelbina, eight miles. Office at Shelbina. W. C. Clark, R. L. Carter and J. E. Ragsdale, incorporators.

SHELBY LONG FORK.—Projected from Shelby, Ky., up Long Fork Valley through Pike and Letcher Counties to coal fields, 40 miles. J. M. Stewart, Ashland, Ky., and Eugene Zimmerman, Cincinnati, Ohio, interested.

SHENANGO VALLEY TRACTION.—Proposed extension from South Sharon, Pa., to New Castle, 18 miles.

SHORT LINE DEVELOPMENT & CONSTRUCTION COMPANY.—Chartered with headquarters at Seattle, Wash., to build railroads in Alaska. Thomas Flammer and Martin Bosworth, of Seattle, and Grant Hamilton, of Denver, incorporators. (Mar. 16, 1906.)

SHREVEPORT, HOUSTON & GULF.—Incorporated to build from point on St. Louis, Southwestern, in Angelina County, Tex., south to Houston, 120 miles. G. A. Kelley, R. D. Collins, of Lufkin, Tex.; J. J. Carroll, Jack Thomas, E. A. Carter, of Camden, Tex.; W. T. Carter and C. L. Carter, of Houston, Directors.

SHREVEPORT, JONESBORO & NATCHEZ.—To build from Jonesboro, La., southeast to Natchez, Miss.; also from Jonesboro north to Shreveport. Office at Jonesboro, La. C. E. Neeley, St. Louis; W. W. Brown and W. W. Ramsey, of Camden, Ark.; W. D. Hutchinson, J. S. Craigie, of Jones, La.; R. N. Garrett, of Eldorado, Ark.; C. A. Henderson, of Arkadelphia, Ark., incorporators. (Mar. 16, 1906.)

*SHREVEPORT NORTHEASTERN. — Building from Shreveport, La., northeast via Minden and Homer, La., and Eldorado, Ark., to Memphis, Tenn., 285 miles. Contracts let to Northeastern Construction Co., of Homer and Shreveport, from Shreveport to Eldorado, 85 miles. Grading finished for 25 miles, and track laid for five miles. A. K. Clingman, Shreveport, La., President, and J. T. Hardeman, Minden, La., Chief Engineer.

*SIBLEY LAKE, BISTENEAU & SOUTHERN.—Contract let to Blackman Bros. for four-mile extension in Louisiana. J. H. Martin, General Manager, Yellow Pine, La.

SIERRA & EASTERN.—Incorporated with office

at Los Angeles, Cal., as the principal place of business, to build from Tehachapi, Cal., east to Searchlight, Nev., 200 miles. J. A. Chanslor and C. A. Canfield, of the Associated Oil Co., interested. H. M. McIntosh, of Chicago, a Director. (Mar. 16, 1906.)

SIERRA OF CALIFORNIA.—Proposed extension from Angels, Cal., north to Gardners, 35 miles.
——Proposed extension of the Sugar Pine Railroad from Sugar Pine, Cal., northeast to Strawberry, 25 miles.
——*The Yosemite Short Line is building from Jamestown, Cal., east to the Yosemite National Park, 50 miles.

SIERRA PACIFIC.—See Eastern Sierra & Pacific.

SIKESTON & SOUTHWESTERN.—To build from Sikeston, Mo., to the Mississippi river, opposite Hickman, Ky., 20 miles. J. F. Gould, F. M. Sikes and Walter L. Hensley, Farmington, Mo.; G. B. McCoy, Sikeston, and M. McGouey, St. Louis, incorporators. (Mar. 16, 1906.)

SIOUX CITY, PIERRE & NORTH-WESTERN.—To build from Sioux City, Iowa, northwest to Hughes County, S. D., thence east via Brookings County to Minneapolis, Minn., with branch from Sioux City north to Sioux Falls, S. Dak., a total of 600 miles. A. S. King, E. N. Thompson and G. N. Borden, of Minnesota; Marion Hoke and Phillip Lawrence, of Huron, S. Dak., incorporators. Offices at Huron and Minneapolis. Reported to be project of Chicago & North-Western.

SIOUX FALLS & SIOUX CITY (Electric).—Organized in Pierre, S. Dak., to build 60 miles.

*SOUTH & WESTERN.—Building from Elkhorn, Ky., via St. Paul, Trenchport, Kingsport, Johnson City, Spruce Pine and Marion to Rutherfordtown, N. C. Work under way from Fink, Va., south to Johnson City, Tenn., 82 miles, and from Altapass, N. C., south to Bostic, 62 miles. Contracts let to Walton, Witten & Graham, Graham, Va., for 13 miles; Walton, Wilson, Oates & Co., Knoxville, Tenn., for 12 miles; Carpenter & Boxley, Clifton Forge, Va., 18 miles, and to Purcell, Allen, Sheehan Co., Harrisonburg, Va., for four miles, and to the Patton Richardson Construction Co., Newport News, Va., for tunnel one-half mile long near Marion, N. C.; 70 miles of track laid.
——See Spartanburg & Northern.

SOUTH BETHLEHEM & SAUCON (Electric).—Incorporated to build from South Bethlehem, Pa., to Centre Valley, seven miles. C. P. Hoffman and William H. Lauer, of South Bethlehem; U. H. Wieand, of Emaus; Hugh E. Crilly, P. F. Cannon and T. H. Mulligan, of Allentown, interested.

SOUTH CAROLINA PUBLIC SERVICE CORPORATION.—Incorporated in Georgia to build from Charleston, Ga., to Columbia, with extensions to Spartansburg and Charlotte, through Lexington, Saluda, Greenwood, Union and Newberry, and from Augusta via Aiken to Orangeburg, a total of 525 miles. J. J. Timmes, President; C. R. Van Etten, Vice-President; J. P. Bonney, Secretary, all of New York. J. C. Lott, R. H. Jennings and J. A. Craig, of Orangeburg, and L. M. Pinckney, of Charleston, interested.

SOUTH DAKOTA CENTRAL.—Projected extension, from Rutland, S. Dak., south to Watertown, 75 miles; six miles built last year.

*SOUTHEASTERN ELECTRIC.—Contract let to E. H. Abodie & Co., St. Louis, for building from Chanute, Kan., to Coffeyville; also from Chanute to Galena. R. C. Rawlings, Kansas City, President.

SOUTHEASTERN RAILROAD.—To build from Jackson, Ky., southeast to Letcher County, 70 miles. Woodson Poor, G. Dennis, A. T. Holcomb, Jr., and L. J. Hopp, all of Cincinnati, incorporators.

*SOUTHERN.—Contracts let to W. J. Oliver Co., Knoxville, Tenn., for laying second track from Charlotte, N. C., to Atlanta, Ga., 260 miles. The contract calls for its completion within five years. Line also to be straightened and grades reduced.
——Johnson City Southern, projected from Marion, N. C., to Johnson City, 80 miles. Some grading is finished. W. V. Oliver, Knoxville, Tenn., contractor. Work suspended.
——Projected line from Pineville, Ky., northeast to Harlan, 25 miles. Surveys.
——Surveys reported from Seneca, S. C., to Rosman for a cut-off between Asheville, N. C., and Atlanta, Ga.
——The Middlesboro Mineral projected from Middlesboro, Ky., to Harlem, 43 miles. Rights of way secured some time ago, but no work done or authorized.
——The Asheville Southern formed for local development in interest of the Southern. No change since last year. No track laid.

*SOUTHERN MICHIGAN (Electric).—Extension from Niles, Mich., to Buchanan, seven miles: five miles graded. A. J. Hammond, South Bend, Ind, Chief Engineer.

SOUTHERN PACIFIC.—Proposed extension of the Gila Valley, Globe & Northern east to Clifton, Ariz., and Morenci.
——The Oregon Eastern is to build from Natron, Ore., southeast to Klamath Falls, 152 miles, to a connection with the California Northeastern.
——The Oregon Eastern is also projected from Natron, Ore., east to Ontario, 320 miles.
——This company has under construction:
*Fallon Railway, between Hazen, Nev., and Fallon, two miles.
*Sacramento Southern, between Sacramento, Cal., and Antioch, 50 miles.
*California & Northeastern, between Weed, Cal., and Klamath Falls, Ore., 64 miles.
*Inter-California, projected from Calexico, Cal., near international boundary, southeast through Mexico, thence northeast across the boundary near Colorado river to connection with the Southern Pacific near Yuma, Ariz., 54 miles. About 15 miles built last year.
*Gila Valley, Globe & Northern has given contract to Robert Scherer & Co., Los Angeles, Cal., for relocating 12 miles from Rice, Ariz., to Cutter.
——Agreement made with the Atchison, Topeka & Santa Fe to build the Northwestern Pacific to connect the California North-Western of the Southern Pacific at Willits, Cal., with the San Francisco & Northwestern, owned by the Santa Fe. Will make through line from Eureka via Willits to San Francisco, 290 miles. The joint line is to be controlled alternately by Southern Pacific and Santa Fe.
——*The Shattuck & Desmond Construction Co., of Los Angeles, grading the Coast Line Railway between Santa Cruz and Davenport, 12 miles, on extension from Santa Cruz, Cal., north via Davenport, San Gregoria, Pescadero and Half Moon Bay to Southern Pacific near Colma, 68 miles; 4.86 miles built last year.
——*The Oregon Western grading from Drain, Ore., west to Scottsburg, thence southwest to Marshfield on the Coos Bay, Roseburg & Eastern, 72 miles. Contract for first 20 miles let to the C. E. Loss Co., of San Francisco.
——Proposed spur tracks along the northern city front of San Francisco as extension of the present Belt line.
——*The Central California is to build the Dumbarton cut-off from Niles, Cal., to Dumbarton Point and thence to Redwood City and San Mateo.
——*Changing gage of South Pacific Coast branch as far as Watsonville. The whole road through to Santa Cruz is to be widened to standard gage.
——Survey for tunnel through Siskiyou mountains, in northern California. (Mar. 16, 1906.)
——The Beaverton & Willsburg to build a connecting line from Beaverton, Ore., to Willsburg, 13½ miles.
——*The new Pacific coast line in Mexico is an extension of the Sonora Railway and is being built by the Cananea, Yaqui River & Pacific. Preliminary surveys made via Mazatlan to Guadalajara, 775 miles. In operation from Empalme, near Guaymas, the terminus of the Sonora, south to Valderrain, 90 miles. Grant Bros. Construction Co., Los Angeles, Cal., has contract for further extension to Alamos, 58 miles, to be finished by Jan. 1, 1908. Alamos is to be on a branch east of main line.
——*Branch of the Cananea, Yaqui River & Pacific from Corral, on Guadalajara line, north along Yaqui river. Projected to Nacozari. Built to Buena Vista, 17 miles. Grant Bros. Construction Co. have contract Buena Vista to Tonichi, 63 miles, to be finished by Jan. 1, 1908.
——The Harriman interests have bought the Corvallis & Eastern, which see.

SOUTH OMAHA & WESTERN.—See Union Pacific.

SOUTH SIDE COAL & RAILWAY CO.—See Arkansas Pacific.

SOUTH TEXAS GULF.—Incorporated to build from Artesia, Tex., northwest to Carrizo Springs, 40 miles. Incorporators include: W. H. Myers and A. W. Raht, of Henrietta; C. M. Wright, R. H. Westlake, A. M. McElenee and M. Schott, of Fort Worth, and J. C. Davis, of Temple.

SOUTHWESTERN INTERURBAN.—Incorporated to build from Arkansas City, Kan., via Parsons to Coffeyville.

SOUTHWESTERN MISSOURI (Electric). — To build lines aggregating 101 miles in Jasper County, Mo., and southeastern Kansas. H. Rogers, of Joplin; E. E. Wallower, E. Bailey, A. Riley, of Harrisburg, Pa.; I. W. Frey, Joplin, Mo.: Samuel McReynolds, of Carthage, Mo., and W. S. Chinn, of Webb City, Mo., incorporators.

SOUTH WILMINGTON & SOUTHERN.—To build from South Wilmington, Grundy County, Ill., south to Wilson, Livingston County. Office at Chicago. A. L. Sweet, W. Farmer, R. H. Gruschow, C. A. Sweet and T. A. Lemmon, incorporators.

SPARTANBURG & NORTHERN.—Proposed line from Spartanburg, S. C., to the North Carolina state line. Geo. L. Carter, of the South & Western, President.

SPOKANE & BIG BEND (Electric). — Projected from Spokane, Wash., to Davenport, 120 miles. Surveys.

*SPOKANE & INLAND EMPIRE (Electric).—The Spokane & Inland building from Spokane, Wash., south to Spring Valley Junction, where the line will divide into two branches; the east arm to extend south to Moscow, Idaho, and the west arm to Colfax, Wash., 146 miles. Proposed connecting link from Colfax southeast to Moscow; also a connecting line further north from a point near Steptoe, Wash., northeast to near Oakdale. Contracts let to Grant, Smith & Co., of Rosalia, and others, for building the entire road. Track laid 97 miles. J. D. Graves, Spokane, Wash., President.
——Surveys being made for a tunnel three-fourths of a mile long in the business district of Spokane.

*SPOKANE-COLUMBIA RIVER RAILROAD & NAVIGATION.—Grading under way from Spokane, Wash., southwest to Ringold Bar, 150 miles. Contracts for grading and bridge work let to M. P. Zindorf, of Connell, Wash., and for track-laying to the Edenbell Construction Co., New York. William F. Kyle, President, and W. S. Foster, Chief Engineer, both of 112 Wall street, Spokane, Wash.

SPOKANE FALLS & NORTHERN.—Route located for cut-off from Denton's spur to point near Chewelah, 22 miles. Work to be begun this month.

*SPOKANE-PEND D'OREILLE RAPID TRANSIT CO.—Building from Spokane northwest to Lake Pend d'Oreille, Idaho, 34 miles. R. A. Hutchinson, General Manager.

SPRING CITY, ATHENS & PIKEVILLE.—To build from Pikeville, Tenn., east to Athens, 40 miles. T. C. Davidson, G. Young, M. V. Reed, A. S. Holloway, J. C. Locke and W. M. Snyder, incorporators.

*SPRINGFIELD, CLEAR LAKE & ROCHESTER (Electric).—Building between Springfield, Ill., and Rochester, 10 miles. Extension from Rochester to Pawnee, 15 miles, projected. J. E. Nelick, Springfield, Ill., Superintendent.

SPRINGFIELD RAILWAY (Electric).—Proposed two-mile extension through the factory district of Springfield, Ohio.

SPRINGFIELD, WILMINGTON & CINCINNATI (Electric).—Incorporated to build from Springfield, Ohio, to Cincinnati, with branch to Xenia. Headquarters at Springfield. Frederick Gargenhire, William C. Morton, Gustav Von Den Steinen, Richard Ingliff, Julian W. Tyler and Horace Andrews, incorporators.

SPRINGFIELD SOUTHWESTERN.—See Missouri Pacific.

SPRING, HAZEL & TRINITY RIVER.—Organized to build from Spring, Tex., east to the Trinity river, near Liberty. Office at Hazel, Montgomery County.

STANDARD & BATON ROUGE.—Organized with headquarters at Monroe, La., to build from Monroe to Standard and south to Cheneyville, 115 miles. J. B. York, President; J. F. Rutherford, Vice-President; C. J. Santag, Secretary and General Manager. (Mar. 16, 1906.)

STATESBORO & MIDVILLE.—To build from Statesboro, Ga., northwest to Louisville, 60 miles. Office at Savannah. C. G. Goburn, J. A. Doyle, R. Meldrin and G. N. Jones, of Savannah, incorporators.

STEPHENSVILLE, NORTH & SOUTH TEXAS.—To build from Stephensville, Erath County, Tex., south to Hamilton, 35 miles. B. C. Cage, Marshall Ferguson and W. S. Watson, of Stephensville, and John Spurlin, of Hamilton, incorporators.

STEUBEN TRACTION CO.—This company, consolidation of the street railroads in Hornellsville, N. Y., and Canisteo, proposes to build south 15 miles to Jasper.

STEUBENVILLE & EAST LIVERPOOL. — Will build an eight-mile connecting line between Toronto, Ohio, and Wellsville. Van Horn Ely, of Buffalo; E. McDonnell, C. A. Smith, J. C. Rothery and G. H. Owen, incorporators.

STILLMORE AIR LINE.—See Wadley Southern.

SUFFOLK TRACTION CO.—See Brooklyn Rapid Transit Co.

SUGAR CREEK & NORTHERN.—See Wheeling & Lake Erie.

SUGAR PINE RAILROAD.—See Sierra of California.

SUMPTER VALLEY.—Proposed extension from Austin, Ore., southwest to Prairie City, 20 miles.

SUMPTER & CHOCTAW. — Proposed extension from Witfield, Ala., five miles south into Choctaw County. E. F. Allison, President, Bellamy, Ala.

SWAN CREEK.—Incorporated to build from Mt. Pleasant, Tenn., to Weatherly, 17 miles. W. H. Northcutt, W. H. Bruce, E. W. Hines and J. B. Keeble, incorporators.

T

*TALLULAH FALLS.—Contract let to A. & C. Wright, Atlanta, Ga., for an extension under the name of the Blue Ridge & Atlantic from Dulards, Ga., to Franklin, N. C., 17 miles; 11 miles built. W. A. Seymour, Otto, N. C., Chief Engineer.

TAMPA & JACKSONVILLE.—See Gainesville & Gulf.

*TAMPA NORTHERN.—Building an extension from Hillsboro, Fla., to Brooksville, 44 miles; 31 miles graded and track being laid.

TAYLOR, BRENHAM & HOUSTON.—Projected from Taylor, Tex., southeast to Brenham, 71 miles. Headquarters at Brenham. All right of way reported secured.

TECUMSEH-NORMAN TRACTION.—Surveys being made to build from Tecumseh, Okla., west to Norman, 40 miles. W. F. Powell, Tecumseh, President.

TENNESSEE & ATLANTIC.—Organized to build from Harriman to Tellico Plains, Tenn. E. C. Myers, President, and Samuel P. Sparks, Secretary. (Mar. 16, 1906.)

TENNESSEE & GULF.—Projected from the mouth of Harpeth river to Clifton, Tenn., 70 miles; also branch from Lobelville to Nashville. (Mar. 16, 1906.)

TENNESSEE & NORTH CAROLINA.—Surveys being made for an extension from Waterville, N. C., to Canton, 35 miles.

TENNESSEE COALFIELDS & SOUTH ATLANTIC TRANSCONTINENTAL. — Projected from Knoxville, Tenn., via Waynesville, N. C., to Greenville, S. C.; with branch from Waynesville to Asheville, and one to Rutherfordton, N. C. Total length about 250 miles. Office at Asheville, N. C.

*TENNESSEE RAILWAY.—Contracts let to Walton, Wilson, Rodes & Co., of Knoxville, Tenn., for extension from Smoky Creek, Tenn., to Beech

Fork, six miles, and from Smoky Creek to Asher's Fork, 8½ miles. Plans made to reduce grades between Oneida and Almy, eight miles.
W. O. Dyer, Chief Engineer, Oneida, Tenn.

TENNESSEE ROADS.—Plans being made by O. G. Wales, of Chicago, to build from Florence, Ala., north via Waynesboro and Linden, Tenn., to Waverly, Tenn., 90 miles.

TEXAS & GULF.—See Gulf, Colorado & Santa Fe.

*TEXAS & PACIFIC.—The Opelousas, Gulf & Northeastern building from Opelousas, La., northeast to point on the Mississippi and southwest to Gulf. Contracts let to Myrick & Andrews, of Opelousas, La., from Melville, La., to Crowley, 58 miles; work under way. C. C. Genung, Chief Engineer, Opelousas, La.; 23 miles built.
——Reported that the Weatherford, Mineral Wells & Northwestern is to be extended from Mineral Wells, Tex., west 25 miles, and ultimately northwest to Trinidad, Col., 600 miles. Final surveys for 150 miles from Mineral Wells made.

*TEXAS, NEW MEXICO & PACIFIC.—Chartered to build from McKinney, Tex., west to Roswell, N. Mex., 500 miles. General contract let to the Rock Island Construction Co., Chicago, and subcontracts to Callahan & Frye. Jesse Shaine, President, and M. J. Healy, General Manager, McKinney, Tex.

TEXAS NORTHERN.—To build from Fort Worth, Tex., south to Egan, and thence northeast to Dallas, 60 miles. Office at Fort Worth. Oscar Wells, G. H. Colvin and J. B. Daniel, of Fort Worth; S. Baker, S. Reinhard, R. A. Ferris and H. E. Jackson, of Dallas; W. A. McDonald, of Cleburne; B. P. McDonald, of Fort Scott, and David Bedell, of Iola, Kan., incorporators.

TEXAS, OKLAHOMA & NORTHWESTERN.—Organized last year to build from the Indian Territory-Oklahoma line in Caddo County, Okla., northwest to the Cimarron river in Woodward County, 450 miles; also branch from Blaine County east to Guthrie and one west through Roger Mills and Day Counties. Patterson Bros., of Benton, Mich.; A. H. Huston, John Deveraux, Charles Seeley and C. E. Carpenter, of Guthrie, Okla., and Henry Knapp, of New York, interested.

*TEXAS RAILWAY.—Building from Port O'Connor, Tex., to San Antonio, 190 miles, and from Gonzales to Smithville, 40 miles. W. S. Hipps & Co., Houston, Tex., contractors. L. A. Guerinjer, Chief Engineer, Victoria, Tex.

TEXAS ROADS.—Large improvements in terminal facilities at Galveston ordered by Railroad Commission, including a causeway across Galveston Bay.
——Plans reported made by Charles M. Schwab for road from Vernon, Tex., to Roswell, N. Mex., 365 miles. J. E. Lutz, of Vernon, Tex., interested. Temporary surveys.
——(Electric).—Stone & Webster, of Boston, Mass., to build projected interurban road from Houston to Galveston, 51 miles, with branches to points on Galveston bay. E. M. House, Austin, Tex., interested.

*TEXAS SOUTHEASTERN.—Building extension from Vair, Tex., to Lufkin, 10 miles.

TEXAS TRACTION.—To build from Dallas, Tex., to Sherman. W. R. Brents, of Grayson County; F. A. Jones, of Harris County, and J. F. Strickland, D. A. Templeton and J. N. Simpson, of Dallas, incorporators.

THOMASVILLE & GULF.—Surveys from Thomasville, Ga., southwest to the Apalachicola Northern, 50 miles. C. R. Knight, Thomasville, interested.

THOMASVILLE & NORTHEASTERN.—Incorporated to build from Thomasville, Ga., northeast to Sparks, 50 miles. J. F. Harris and C. C. Shellay, of Pavo; B. Croft, of Hempstead, and J. J. Hodges, incorporators.

*TIDEWATER.—Building from Norfolk, Va., via Roanoke, west through Virginia, 332 miles, and from that point under the name of the Deepwater north in West Virginia to Deepwater, 118 miles. Grading from Norfolk to mile post 103 finished last year. Contract from m. p. 103 to m. p. 123 let to J. G. White & Co., 20 miles, finished last month. Other contracts let for grading from m. p. 123 west as follows: Wright & Bonsal, 22 miles; McDermott Contracting Co., 26½ miles; Butler Bros. Construction Co., 15 miles; Carpenter, Frazier, Boxley & Co., 20 miles; Lane Bros. Co., 32.1 miles; the D. A. Langhorne Co., Inc., 20 miles; MacArthur Bros. Co., 111 miles. Track laid on the Tidewater 105 miles and on the Deepwater 73 miles. The various contractors mentioned above have let some of the work to the following sub-contractors:
Wright & Bonsal to R. C. Collins, Polland & Haw.
Butler Brothers to Johnson & Edwards Engineering & Construction Co., H. H. Perrow & Co., Jamieson & Dyer.
Carpenter, Frazier, Boxley & Co. to Suiter & Dillon, Vaughn & Boxley, P. S. Boxley & Co.
Lane Brothers Co. to J. E. Ellis & Co., Coleman & Daniels, Roberts, Ferguson & Co., J. F. Lane & Co., Veitch & Starritt, Adams & Jennings, F. H. Sprague, P. H. Marshall, Son & Co., G. M. McDonald, Lane, Wisely & Bealley.
The D. A. Langhorne Co., Inc., to Roberts, Ferguson & Co., John Saloney, W. O. Lipscomb Co., Pitts & Calligan, Howland & Wright, J. L. Pitts & Co., Campbell & Ballard, Ballard Craig & Co., A. Parrio & Co., S. W. Calder & Co., D. A. Allen & Co., Berry & Ferrata.
MacArthur Brothers Co. to Bates & Rogers Construction Co., Jerry Connelly, W. H. Johnson, W. H. Winston & Co., Price, Griscom & Co., Standard Construction Co., Callahan, Hornick & Co., Ettore Ferrata, Harmon Lindsay & Co., Ingles & Shelvurne, P. J. Millett, J. C. Zobrist & Co., Cahill & Purnell, Mike Elmore, Pikeville Grading Co., F. H. Hoistein, Leonard, Beckman & Co., Robert Woods & Co., D. J. McDonald, Mason, Hanger, Coleman & Co., Carpenter & Boxley, W. N. Camp & Co., Winston & Co., James Hearn & Co., Garland, Litz & Co., Douglass Brothers Co.
——The Marsh Fork incorporated to build an extension of the Deepwater from Surveyor Station, W. Va., 100 miles to the Ohio river at the mouth of the Great Kanawha river.
——See Virginia Railway.

TIDEWATER DEVELOPMENT CO. (Electric).—To build from Gadsden, Ala., southwest to Tuskaloosa, 125 miles. From this point the company to operate steamers south on the Warrior, Tombigbee, Alabama and Mobile rivers to Mobile. J. M. Dewberry, President; Lewis Miller, Vice-President, and J. W. Donnelly, Secretary.

TIOGA & CLINTON.—Incorporated to build from Morris, Tioga County, Pa., to point in Chapman Township, Clinton County, Pa. H. T. Hall, Lock Haven, Pa., President. B. F. Geary, James C. Smith, H. T. Hudson, C. O. Dunlap, John T. Cupper, H. T. Hall, all of Lock Haven, Pa., and E. S. McNaul and M. W. Denman, of Philadelphia, Directors.

TOLEDO & INDIANA (Electric).—Preliminary surveys for extension from Bryan, Ohio, west to Waterloo, Ind., 30 miles; also for a branch from Delta, Ohio, southwest via Napoleon to Defiance, 30 miles.

TOLEDO, MARSHALL & NORTHERN.—Proposed line from Bay City, Mich., southwest to Montpelier, Ohio. Office at Marshall, Ohio. (Mar. 16, 1906.)

TOLEDO RAILWAY & LIGHT CO.—New branch to be built from Toledo to Ottawa Beach, 15 miles.

TOMBIGBEE.—Proposed extension from Healing Springs, Ala., north to Butler.

*TONOPAH & GOLDFIELD.—Building extension from Goldfield, Nev., southeast to Bullfrog, 80 miles.

TONOPAH & GREENWATER. — Incorporated in February in California, to build from Amargosa Borax Works in Inyo County, Cal., to Greenwater. F. M. Smith, of Oakland, Cal.; C. B. Zabriskie, of New York; De Witt Van Buskirk, of Bayonne, N. J., incorporators.

*TONOPAH & TIDEWATER.—Building from Ludlow, Cal., north to Tonopah, Nev., 250 miles. In operation from Ludlow north to two miles beyond Sperry, 80 miles. Contract let to R. R. Coleman, Los Angeles, Cal., for building from the San Bernardino-Inyo County line north to Lila C mine, 45 miles.

TONOPAH TERMINAL.—Incorporated to build from Liberty, Cal., to Silver Peak, 100 miles. Camp Bros., of Philadelphia, said to be interested. W. C. Wynkoop, President, and S. H. Park, Secretary. (Mar. 16, 1906.)

TOPEKA & NORTHWESTERN.—See Union Pacific.

TRANS-ALASKA-SIBERIAN. — Incorporated in New Jersey by Loicq de Lobel, No. 11-bis Rue d'Edinbourg, Paris; J. A. L. Waddell, Kansas City, Mo.; John J. Healy, Seattle, Wash.; William H. Black, 11 Wall street, New York, and John R. Turner, of the Corporation Trust, 15 Exchange place, Jersey City. To build in Alaska and Siberia, with tunnel under Behring straits. Proposed western terminus is Kansk, on the Siberian railway, and the eastern on the Alaska-Canada boundary, 3,750 miles, and branches 2,250 miles.

TRINITY & BRAZOS VALLEY.—See Colorado & Southern.

TRINITY VALLEY & NORTHERN.—To build from Dayton, Tex., north to Cleveland, 25 miles. L. Fouts, A. L. Rutt and J. B. Sterling, of Dayton; C. B. Wood, C. Ross and W. B. Cottingham, of Houston; J. C. Johnson, of Richmond; C. L. Rutt, of Beaumont, and W. H. McGregor, of Carson, incorporators.

TULSA, TEXAS & GULF.—Organized by L. Howard Lee, of Oklahoma City, to build from Matagorda Bay, Tex., north to Oklahoma City, Okla., and Tulsa, Ind. T., about 600 miles. M. H. Smythe, Gainesville, Tex.; H. V. Pentecost, Guthrie; J. W. Helt and M. S. Lee, Oklahoma City; D. D. Merry, Roswell, N. Mex., Directors. (Mar. 16, 1906.)

TUSCARORA TRACTION CO.—Incorporated to build from Addison, N. Y., west to Jasper, 15 miles. Thomas E. Hardin, of Addison; George R. Brown and John M. Connelly, Directors.

U

UMATILLO CENTRAL.—See Oregon Railroad & Navigation Co.

UNIONTOWN & WHEELING SHORT LINE.—See Western Maryland.

*UNION PACIFIC.—Contract let to the Kilpatrick Bros. & Collins Contracting Co., of Beatrice, Nebr., to extend the Topeka & Northwestern from Onaga, Kan., to Marysville, 32½ miles.
——*Also for building the South Omaha & Western cut-off from South Omaha, Nebr., west to Lane, 11½ miles. Half graded.
——*Branch from O'Fallon, Nebr., northwest to Northport, 114 miles; all graded; track laid to Lewellen. Contract let to W. C. Bradbury & Co., Denver, from Lewellen northwest to Northport, 56 miles.
——*Connecting line from Stromsburg, Nebr., west to Central City, 23 miles. Finished to Hordville, 18 miles. Contract let to Wood, Bancroft & Doty, of Omaha, for five miles from Hordville west to Central City.
——Surveys reported for double cut-off from Laramie, Wyo., south to Platteville, Colo., 96 miles. Double cut-off, one part from point 20 miles south of Cheyenne on present line west up Lone Tree Valley to point about 10 miles southwest of Cheyenne, where will divide into two branches, one running northeast to Cheyenne, and the other northwest to the main line between Boris, Wyo., and Granite Canyon.
——Surveys reported from Kansas City to Memphis, Tenn. 370 miles.
——Proposed extension of the Cedar Rapids branch from Spalding, Nebr., northeast 150 miles into South Dakota. (Mar. 16, 1906.)
——See Missouri River & Gulf.

UNION TRACTION OF IOWA.—To build from Marshalltown north to Waterloo; also from Marshalltown south to Newton, a total of 78 miles. Office at Marshalltown, Iowa. D. T. Denmead, Marshalltown, President; J. E. Sedgewick, Waterloo, Vice-President; L. C. Norris, Marshalltown, Secretary, and George E. Lichty, Waterloo, Treasurer. (Mar. 16, 1906.)

*UNITED RAILWAYS OF ST. LOUIS.—Planning to rebuild each year 25 to 30 miles of line, until its 470 miles of lines are rebuilt.

UTAH & IDAHO.—Organized to build from Provo, Utah, north to Logan, 150 miles. Office at Ogden. David Eccles, President; M. S. Browning, Vice-President; C. H. Kircher, Secretary, and H. H. Spencer, Treasurer.

UTICA SOUTHERN (Electric).—Incorporated to build 26 miles of road in Oneida and Madison Counties, New York. M. W. Terry, of Waterville; F. K. Baxter, of Utica, and W. M. West, of Hamilton, Directors.

V

*VALDEZ, MARSHALL PASS & NORTHERN.—Building from Valdez, Alaska, to Eagle City, 412 miles; 10 miles graded. F. D. Pierce, F. H. Huck, John D. Fearlake and Kenneth Rose, all of New York, and La Grand Bouker, of Jersey City, incorporators. Office at 243 Washington street, Jersey City.

VALDOSTA & NASHVILLE.—To build railroads in Georgia. H. B. Peeples, J. A. Alexander, J. W. E. Poell, of Nashville; R. D. Stevens, of Valdosta, Ga., incorporators.

VALDOSTA SOUTHERN.—See Georgia & Florida.

VALLEJO & NORTHERN (Electric).—Incorporated to build from Vallejo, Cal., northeast to Woodland, with branches, 70 miles; location surveys; rights of way being secured. Office at 327 Georgia street, Vallejo, Cal. Melville Dozier, Jr., 649 Mariposa street, Oakland, Cal., President and Chief Engineer.

VALDOSTA, MOULTRIE & NORTHWESTERN.—Incorporated to build from Valdosta, Ga., northwest to Moultrie, 38 miles. E. P. Rose, C. R. Ashley, H. C. Briggs, J. A. Dasher, R. F. Ousley, J. Y. Blitch and D. C. Ashley, all of Valdosta, interested.

*VANDALIA.—Extending second track from point two miles west of Union Station at Indianapolis, Ind., to top of grade at Ben Davis, 4¼ miles.
——*Second track being laid by Jones Bros., Columbus, Ohio, from Knightsville to the East Yard, Terre Haute, 14 miles. This includes a better line between Brazil and Seelyville, eight miles.
——*Second track from west end of Wabash river bridge at Terre Haute to Macksville, one mile being laid.
——Permission granted to lay 12 additional tracks at grade across Belmont avenue at Indianapolis, Ind.

VEBLEN & NORTHWESTERN.—Grading completed from Veblen, S. Dak., east to the Minnesota line, 32 miles. M. J. Hawley, Brandt, S. Dak., President.

*VERSAILLES & SEDALIA.—Building from Versailles, Mo., northeast six miles to property of the Missouri Cannel Coal Mining Co. Half the grading finished. Office at Versailles. J. Applewhite, President, and H. A. Bailey, Chief Engineer.

VICKSBURG, NATCHEZ & GULFPORT.—Organized to build from Vicksburg, Miss., southeast to Gulfport, 225 miles, with branch west to Natchez, 100 miles.

VIRGINIA & CAROLINA COAST.—See Norfolk & Southern.

VIRGINIA & KENTUCKY.—Proposed extension from Wise, Va., north toward the Kentucky border.

VINING & COLEMAN.—Projected from Coleman, Tex., southeast to Austin, 150 miles. W. L. Vining interested.

VINITA & WESTERN.—Projected from Vinita, Ind. T., north to Coffeyville, Kan., 50 miles; first 10 miles graded; work suspended. H. A. Genung, Vinita, Ind. T., is Chief Engineer.

VIRGINIA & POTTS CREEK.—See Norfolk & Western.

*VIRGINIA & SOUTHWESTERN.—Contract let to Callahan Construction Co., of Knoxville, Tenn., for extension from Moccasin Gap, Va., to Persia, Tenn., 37½ miles. E. S. Fraser, Bristol, Tenn., interested.

VIRGINIA AIR LINE.—Chartered to build from point between Keswick and Gordonsville, Va., south to Farmville, 60 miles. T. O. Troy, Amherst, President, and J. M. Robertson, Charlottesville, Secretary.

*VIRGINIA ORE & LUMBER COMPANY.—Contract let to Vaughan Construction Co., of Roanoke from Town Creek, Va., west to Stuart's Knob, 12 miles. F. A. Hill and H. D. Lafferty, interested. Office at Roanoke, Va.

VIRGINIA RAILWAY.—Chartered this month to take over the Deepwater Railway and the Tidewater Railway.

W

*WABASH.—About 30 miles of double track to be built each year until the entire line is double-tracked between St. Louis and Chicago.
——Proposes double-tracking 30 miles of the Detroit division.
——Proposed revision of the Moberly division.
——See Wheeling & Lake Erie.

WABASH SOUTHERN.—See Missouri Pacific.

WABEE & WAWASEE.—Projected from Syracuse, Ind., west via Wabee lake, in Kosciusko County, to Milford, with branch from Syracuse to Lingle lake, 12 miles. A. St. Newberry, W. D. Frazer, C. I. Reilly and J. P. Nolan are interested.

WACCAMAW RAILROAD.—Organized to build from near Oldtown, N. C., west to Manlyville, 50 miles. E. Nelson, of Detroit; E. S. Hartwell, Chicago; J. E. Clark, C. E. Clark, E. H. Silliman and W. H. Chadbourn, of Wilmington, all of Waccamaw Land & Lumber Co., incorporators. (Mar. 16, 1906.)

WADSWORTH & WESTERN TRACTION.—Planning to build from Cleveland, Ohio, southwest to Cincinnati, with a branch through Medina, Wayne, Ashland and Richland Counties.

WADLEY SOUTHERN.—Formerly the Stillmore Air Line; projected extension from Wadley, Ga., north to Comak, 40 miles, and ultimately north to Elberon, 50 miles.

WARREN, JOHNSVILLE & SALINE RIVER.—Chartered to build from Warren, Ark., southeast 25 miles. S. H. Fullerton, President, and C. L. Robinson, Secretary, both of St. Louis; and J. F. Forsyth, of Warren, Ark., General Manager. (Mar. 16, 1906.)

WASHINGTON & GETTYSBURG.—Incorporated to build from Gettysburg, Pa., to Harpers Hill, eight miles. J. W. Le Gore, of Le Gore, Md., President; W. H. O'Neill and W. T. Ziegler, Gettysburg; J. R. Birkholder, Lancaster; R. S. Potter, Philadelphia; C. A. Welker and W. B. Stanbaugh, Woodsboro, Directors.

WASHINGTON & GREAT NORTHERN.—See Great Northern.

WASHINGTON-ALASKA TRANSPORTATION RAILROAD CO.—Organized in Phoenix, Ariz., to build from Nome City, Alaska, northwest to Cape Prince of Wales, for the northern division; from Nome City northeasterly, to Council City, thence easterly to Koyukuk on Norton bay; thence southeasterly up the Yukon and crossing it, to Tanana river; thence south to White Pass, Skagway and Juneau; thence across Stikine river to Vancouver, in all 2,000 miles.

*WASHINGTON, BALTIMORE & ANNAPOLIS (Electric).—Building from Baltimore to Washington, 31 miles, with branch to Annapolis, 14½ miles. Half graded.
——The Baltimore Terminal Co. incorporated to build a terminal line at Baltimore.

*WASHINGTON, IDAHO & MONTANA.—Contract let to Wren & Greenough, of Spokane, Wash., for extension from Harvard, Idaho, to Bovill, 19 miles.

WASHINGTON, PATUXENT & DRUM POINT.—Incorporated to build from point on Chesapeake Beach Railway, southeast to Drum Point and Solomon's Island, on Chesapeake Bay, 30 miles.

WASHINGTON ROADS (Electric).—Proposed line from Big Falls, Wash., along the Pend d'Oreille river to point north of Newport, 31 miles. David T. Ham, interested.

*WASHINGTON, WESTMINSTER & GETTYSBURG.—Contract let to Ira Taylor, 20 Broad street, New York, for building from Washington, Va., northeast to Gettysburg, Pa., 90 miles. J. B. Colegram, President, Sterling, Va.

WAUPACA & GREEN BAY.—Incorporated to build from Waupaca, Wis., northeast to Scandinavia, 11 miles. A. G. Nelson, A. M. Renney, W. B. Johnson, J. Gordon and A. A. Aggerbeck, interested.

WAYCROSS, BAXLEY & VIDALIA.—To build a line from Waycross, Ga., north to Vidalia, 65 miles. C. W. Dean, of Baxley; J. S. Bailey, W. H. Buchanan and J. T. Myers, of Waycross, incorporators.

WAYNESBURG & WASHINGTON.—Proposed extension from Waynesburg, Pa., south to Dotysburg. Final surveys. (Mar. 16, 1906.)

WEATHERFORD, MINERAL WELLS & NORTHWESTERN.—See Texas & Pacific.

WEST COAST TRACTION.—To build from Olympia, Wash., to Tacoma, 320 miles, including branches. C. H. Weeks and Cyrus Bradley, Spokane; B. J. Weeks, Tacoma; A. D. Leverson, London, England; J. W. Reynolds, Chehalis, and F. B. Hubbard and W. W. Cannon, Centralia, Wash., incorporators.

WESTERN & GULF.—Surveys from Hawkinsville, Ga., to Dawson, 85 miles. Contracts were to be let early this spring. Crawford Wheatley, Americus, President.

WESTERN MARYLAND.—The Uniontown & Wheeling Short Line projected from Uniontown, Pa., west to Wheeling, W. Va., 68 miles. Surveys and some work done.
——The Pittsburg, Westmoreland & Somerset projected from Zufall, Pa., to Somerset.
——*Contract reported let to Fisher, Gilmore & Reiley, of Baltimore, for reconstructing and double tracking from Owings Mills, Md., north to Emory Grove, 6½ miles.
——Proposed low-grade line from Emory Grove, Md., west to Williamsport, 73 miles.

WESTERN MISSOURI INTERURBAN.—To build from Odessa, Mo., south to Greenfield, 125 miles. Office at Clinton, Mo., and at Sioux Falls, S. Dak. D. J. Haugeberg, F. S. Gray, E. W. Campbell and S. S. Halliday, of Clinton, Mo., incorporators.

WESTERN NEW YORK & PENNSYLVANIA.—See Pennsylvania.

WESTERN OKLAHOMA.—See Atchison, Topeka & Santa Fe.

*WESTERN PACIFIC.—Building from Salt Lake City, Utah, west to Oakland, Cal., 929 miles, of which 122 miles are in Utah, 427 miles in Nevada and 380 miles in California. Contracts let to the Utah Construction Co., Ogden, Utah, for 110 miles in Utah, 107 miles in Nevada and 174 miles in California, and to E. B. & A. L. Stone, of Oakland, Cal., for 185 miles in California. Contracts for remaining 326 miles in Nevada were to be let last month. Grading in Utah finished and 94 miles of track laid; 130 miles graded in California and 10 miles of track laid. There are now about 5,000 men at work at various points on the line. There will be 48 tunnels, aggregating 48,263 lineal feet.

WESTERN TEXAS & GULF.—Incorporated to build from San Angelo, Texas, to Stanton, and ultimately north to Amarillo. E. H. D. Caston, J. T. Witt, and E. P. Speers, of Dallas; W. P. Edwards and J. W. Pinson, Big Springs, interested.

WEST JERSEY & SEASHORE.—See Pennsylvania.

WEST MICHIGAN INTERURBAN.—Projected from Grand Rapids, Mich., to Hart, 80 miles. H. H. Christ, Grand Rapids, Chief Engineer.

WEST PENN (Electric).—Greensburg & Western projected from Greensburg, Pa., west to Irwin, 12 miles.

WEST SHORE TRACTION.—Incorporated to build from Orangeburg, Rockland County, N. Y., north to Haverstraw. Frank J. Whan, A. J. Whan, E. J. Welsh, N. E. Heine, G. P. Fall, G. S. Fulton, of New York; A. S. Brown, Brooklyn; E. G. Roff, Jr., Orange, N. J., and E. A. Hilton, Paterson, N. J., Directors.

WEST TEXAS & NORTHERN.—To build from Kerrville, Tex., north to Amarillo, 450 miles. Office at Big Springs. E. P. Sears, J. T. Pinson, J. W. Pierson, John T. Witt, E. H. D. Gaston, J. A. Wilhite, all of Dallas; Will P. Edwards, W. R. Cole, G. L. Brown and S. H. Morrison, all of Big Springs, incorporators. (Mar. 16, 1906.)

WEST VIRGINIA, PITTSBURG & ATLANTIC.—To build from Rowlesburg, W. Va., to Durbin, 100 miles. C. W. Mosser and C. E. Mower, Hendricks, W. Va.; E. D. Baker, Beverly, W. Va.; H. A. Armstrong, Parsons, W. Va., and R. F. Whitner, Philadelphia, incorporators. (Mar. 16, 1906.)

*WEST VIRGINIA MIDLAND.—Incorporated to build from Sutton, W. Va., to Marlinton, 50 miles. Has bought the Holly River & Addison from Holly Junction to Webster Springs, 30 miles, as part of its line. Building extension up Elk River valley above Webster Springs, 20 miles.

*WHEELING & LAKE ERIE.—Building the Lorain & West Virginia from Wellington, Ohio, north to Lorain, 20 miles. Contracts let to G. M. Kepner, of Connorsville, and to F. J. Petterson, of Cedar Rapids, Iowa; 15 miles built last year.
——*On the Sugar Creek & Northern cut-off from Bolivar, Ohio, northwest to Orrville, 26 miles. J. C. Carland & Co., of Toledo, contractors. Fifteen miles were finished in 1906; work stopped because of lack of funds.
——Second track from Pittsburg Junction to Huron Junction, 124 miles, to be built when funds available.

*WHITEHALL & GRANVILLE (Electric).—Work reported begun on extension from Middle Granville, N. Y., southeast to West Pawlet, Vt. F. B. Gridley, Troy, N. Y., Engineer of Construction.

WHITE PASS & YUKON.—Plans made by Close Bros., of London, to build in Alaska from the coast to Orca, 70 miles; thence to Fairbanks. G. M. Rice, Chief Engineer.

WHITE RIVER VALLEY.—See Chicago, Milwaukee & St. Paul.

WHITE SULPHUR SPRINGS.—Chartered to build from Van Buren, Ark., to Uniontown, 15 miles. R. P. Allen, Van Buren, President; Jas. H. Van Brunt, St. Joseph, Mo., Vice-President; J. L. Rea, Secretary, and B. E. Powers, Treasurer, both of Van Buren. (Mar. 16, 1906.)

WHITE TOP.—To build from Grassy Ridge, Va., south to Upperford; also from Grassy Ridge to Blevins Gap. Office at Azen, Va. W. A. Hassenger, of Lamona, President, and J. L. Hurt, of Abingdon, Secretary. R. M. Page and G. E. Barnes, incorporators.

WICHITA MOUNTAIN & ORIENT.—To build from Lawton, Okla., north to Day County, and from Lawton, east to Atoka, Ind. T. W. M. Smith, H. A. Loyd, E. W. Moll, J. E. Thomas and C. A. Rising, of Lawton, incorporators.

WILKES & LINCOLN.—Incorporated to build from Washington, Ga., to Lincolton, 50 miles.

WILKESBARRE & HAZLETON (Electric).—Terminal improvements to be made in Wilkesbarre and Hazleton, Pa.

*WISCONSIN & NORTHERN.—Successor of the Green Bay, Oshkosh, Madison & South-Western. Building from Menasha, Wis., to North Crandon, 125 miles. Contract let to McDonnell, O'Connor & Co., of Shawano, from Gresham to Langlade, 25½ miles; built from Shawano to Neopit, 21 miles, and from Crandon to connection with the Soo Line, seven miles. Grading completed from Gresham to Neopit, 11 miles; additional contracts soon to be let. William Cambier, Oshkosh, Wis., Chief Engineer.

*WISCONSIN CENTRAL.—The Lake Superior & Southeastern building from Ladysmith, Wis., north to Duluth, Wis., 125 miles. Considerable grading finished.
——Projected connecting line from Portage, Wis., south to Janesville, 40 miles.

WISCONSIN VALLEY (Electric).—Incorporated to build from Grand Rapids, Wis., northeast to Stevens Point, 15 miles, and via Wausau to Merrill, 60 miles. Incorporators include George A. Whiting, of Neenah; H. F. Whitcomb and George Lines, of Milwaukee.

WISE TERMINAL.—Surveys being made for extension north from Glamorgan, Va., to the Kentucky state line, 15 miles.

WOODLAWN STREET RAILWAY (Electric).—To build from Beaver to New Sheffield, six miles. Office at Aliquippa. D. G. Dugan, S. J. Dugan, James A. Newell, J. E. Wilson and R. Burgher, incorporators. J. F. Reed, of Beaver, Pa., interested.

WYNNE, NEWPORT & WESTERN.—Incorporated to build from Wynne, Ark., to Newport, 40 miles. O. N. Killough, Wynne, President; Isaac Goldman, St. Louis, Vice-President; W. H. Barnes, Wynne, Secretary; Sigmund Wolf, St. Louis, Treasurer, and M. M. Stuckey, Newport, Ark., Attorney.

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YAKIMA VALLEY TRACTION.—Incorporated to build 120 miles in Spokane and Yakima valleys, Wash. W. A. Bell, North Yakima, interested.

YAZOO & MISSISSIPPI VALLEY.—See Illinois Central.

YELLOWSTONE PARK.—See Oregon Short Line.

*YELLOWSTONE PARK.—To build from Bridger, Mont., southwest to Cook, 125 miles. Contracts let to Western Development Co., of Belfry, Mont.; 26 miles in operation. No connection with Oregon Short Line road of same name.
——See Oregon Short Line.

YOSEMITE SHORT LINE.—See Sierra of California.

*YOSEMITE VALLEY.—Building with own force extension from Bagby, Cal., east to the Yosemite National Park, 30 miles.

*YOUNGSTOWN & OHIO RIVER.—Building from Salem, Ohio, to East Liverpool. Contracts let to Cleveland Construction Co., Salem, Ohio, for 16 miles from Washingtonville to West Point. Graded for eight miles. George L. Wells, Salem, Ohio, Chief Engineer.

*YOUNGSTOWN & SOUTHERN.—Contract let to J. G. White & Co., of New York City, for the electrification of this road between Youngstown and Columbiana, 16 miles.
——*Building extension to Leetonia, five miles, to be electrified by J. G. White & Co. To be eventually extended from Leetonia south to East Liverpool, 30 miles.

YREKA RAILWAY.—Preliminary surveys under way for extension from Yreka, Cal., to Etna, 40 miles.

YULE CREEK.—Incorporated to build from Bryant, Colo., through Pitkin and Gunnison Counties to headwaters of Yule creek. G. W. Bowen, S. I. Heyn, Pope Clerk, A. E. Davis and R. E. Black, of Denver, and J. B. Bowen and W. R. Jewell, of Redstone, interested. (Mar. 16, 1906.)

Canada.

ALBERTA & FLATHEAD.—Projected from point on Crow's Nest Pass branch of the Canadian Pacific, near Pincher Station, to the source of Flathead river. A. C. Kommis, Pincher Creek, Alb., applicant.

ALBERTA RAILWAY & IRRIGATION CO.—See Crawford Bay & St. Mary's.

ASHCROFT, BARKERVILLE & FORT GEORGE.—Projected from Ashcroft, B. C., to Fort George, 300 miles. C. S. Riley and H. C. Crowe, of Winnipeg, Man., applicants. (Mar. 16, 1906.)

ATHABASKA RAILWAY.—Authorized from Edmonton, Alb., north to Fort Murray, 240 miles; projected from Fort Murray north to Fort Smith, on Slave river, 250 miles.

ATLANTIC, QUEBEC & WESTERN.—To build from Gaspe, Que., west to Amqui, thence south to Edmundston on the St. John river, 260 miles.
——To build from a point near Gaspe south along coast to Paspebiac, 102 miles. Charles Brien and Joseph Lavoie, of Gaspe, Directors, and E. Stanley Elvey, Secretary.

BARRIE & ORILLIA.—Projected from Grenfell, Ont., via Barrie, to Orillia. W. A. Boys, Barrie, Ont., solicitor.

BURRARD-WESTMINSTER BOUNDARY RAILROAD & NAVIGATION CO.—Organized to build from Vancouver, B. C., to Burrard Inlet. Tupper & Griffen, Vancouver, B. C., solicitors.

CANADIAN EASTERN.—Incorporated to build from Montreal northeast to the Gulf of St. Lawrence. E. B. Garneau, of Quebec; L. Moore, V. Cussow, D. W. Campbell and A. Geoffrion, of Montreal, Directors. Office at Montreal.

CANADIAN NORTHERN SYSTEM.—Work under way or projected as follows:

*CANADIAN NORTHERN.—Contract reported let to MacDonald-McMillan Contracting Co. from Etoimami, Sask., on Prince Albert line, northeast to The Pas, Keewatin, 80 miles, the first section of projected line to Fort Churchill, on Hudson bay.
——*Work reported under way on branch from Dalmeny, Sask., to Coulter, Man., 45 miles.
——Projected connecting line from Brandon, Man., via point on Hartney Junction-Virden line, south of Virden, west to Regina, Sask., 175 miles.
——Proposed extension in Minnesota from North Lake, Ont., the terminus of the Stanley Junction branch, west to connection with Detroit & Iron Range.

——*Building extension of Rossburn Junction-Rossburn branch, from Rossburn, Man., northwest to western boundary of Manitoba. Further extensions projected, one northwest to Buchanan, Sask., on main line, the other west via Dundurn, on the Q., L., L. & S. to point near western boundary of Saskatchewan.
——*Building from Edmonton, Alb., north to Athabasca Landing, 100 miles; work under way on 21 miles.
——Proposed connecting line from Aberdeen, Sask., on main line, north to Fenton, on Prince Albert line.
——Proposed extension of Thunder Hill branch from Benito, near western boundary of Manitoba, west to proposed Aberdeen-Fenton connecting line.
——Proposed connecting line from Prince Albert, Sask., southwest to main line at North Battleford.
——Proposed branch from main line at Langham, Sask., northwest to Carlton.
——Proposed branch from Vermilion, Alb., west to Wetaskiwin.
——Proposed extension from Edmonton, Alb., northwest to western boundary of Alberta.
——This company has asked authority to build the following lines:
——Branch from Humboldt, Sask., southwest to Township 29, west of the third meridian, then westerly and southwesterly to Calgary, Alb.
——Branch from point in Township 29, west of third meridian, southwest to point on Qu'Appelle, Long Lake & Saskatchewan, between Craik and Bladworth.
——Branch from Humboldt, Sask., northwest to a point in Township 43, west of second meridian.
——Branch from South Battleford, Sask., west to point in Township 44, Range 27, west of third meridian.
——Branch from North Battleford, Sask., northwest to Township 59, west of fourth meridian.
——Branch from Strathcona, Alb., south to Calgary.
——Branch from Regina, Sask., southwest to international boundary.
——From Saskatoon, Sask., southwest to South Saskatchewan river.
——From junction of Athabasca and McLeod rivers in Alberta southwest to the headquarters of the McLeod river.
——From Battleford, Sask., west 100 miles.
——Branch from a point near Strathcona, Alb., southwest to Pigeon Lake, Alb.
——Branch from point south of Neepawa, Man., northwest to main line, near the crossing of the South Saskatchewan river.
——From Regina, Sask., west to point on Red Deer river in Alberta, with a branch west of the Saskatchewan river, running north to point in or near Carlton, on North Saskatoon river.
——Map in annual report shows Duluth, Rainy Lake & Winnipeg as Canadian Northern line under construction. See D., R. L. & W. under United States.

*CANADIAN NORTHERN ONTARIO.—Building from Parry Sound northwest to Sudbury; projected thence north to Moose Mountain iron mines.
——*Contract let to Central Contracting Co., Toronto, to build from Nepigon, Ont., north to Lake Nepigon.
——Proposed branch from nine miles above Parry Sound, Ont., northeast to North bay, 75 miles.
——Plans filed for extension from Sudbury to Batchewaung bay, Lake Superior, and along the north end of Lake Superior to Canadian Northern at Kashabowie, west of Port Arthur.
——*Line projected from Key Inlet, near Sudbury, Ont., east to Ottawa, Ont., 350 miles. Contract reported let to J. Y. Schell from Ottawa east to Hawkesbury, 50 miles.
——Application made for authority to build extensions and branches in Ontario as follows: Washago west to Lake Huron near Kincardine; Arnprier south to St. Lawrence river between Kingston and Brockville; Pembroke southwest to Lake Ontario between Toronto and Belleville; Toronto-Ottawa line northwest to Georgian bay, near Collingwood or Owen sound; Toronto-Ottawa line west through or near Toronto, Hamilton and London to Windsor, with branches to St. Thomas and Sarnia and loop north of Toronto; Niagara river northwest via Hamilton to Lake Huron near Goderich; Lake Erie west of Port Colborne north through Brantford or Berlin to Georgian bay; from point near Washago to Georgian bay east of Collingwood; Montreal-Ottawa line north of Montreal, west to line authorized in Leeds or Lanark County.

*CANADIAN NORTHERN QUEBEC. — Contract let last year to O'Brien & Mullarkey, of Montreal, on extension from Garneau Junction, Que., to Quebec, 84 miles. Graded from Carneau to St. Casimir, 35 miles.
——*Contract let to same firm for branch from St. Jerome, Que., to Montfort, 15 miles; all graded, but no track laid.
——Charter reported granted for proposed line from Quebec bridge east to Moncton, N. B.
——Proposed line from Quebec east, via Moncton, N. B., to Pugwash, N. S., with branch in New Brunswick south to St. Johns.

*CANADIAN PACIFIC. — Double-tracking from Winnipeg, Man., east to Fort William, 427 miles; 91 miles finished, the rest to be finished this year. Foley Bros., Larsen & Co., Winnipeg, general contractors. Includes a cut-off from Winnipeg, east to Molson, Man., 35 miles. Subcontracts let a year ago as follows: Hoagland & Sharpe, for change of line, four miles, at Eagle river; John E. Bostrom, two miles at Cross Lake; Larsen Bros., two miles at Kilmar, including 400 ft. tunnel; Fred Peterson & Co., three miles between Ostersund and Busteed.
——*Contract let to Foley Brothers, Larsen & Co. for work on Toronto-Sudbury line from Bolton, Ont., north to Romford, 226 miles; about 70 miles built.
——*Contract let to Toronto Construction Co. for building the Georgian Bay & Seaboard from Victoria Harbor, Ont., on Georgian bay, southeast to Peterborough, 96 miles.
——Surveys from London, Ont., west via Strathroy and Petrolia to Corunna on the St. Clair river, 60 miles.
——Proposed branch from Flesherton, Ont., northwest to Southampton, 55 miles.
——The line between Montreal and Quebec, 172 miles, to be double-tracked this spring.
——*Grading contract let to J. D. MacArthur, of Winnipeg, for extension of Stonewall branch from Teulon, Man., north 20 miles; eight miles built last year.
——*General contract let to Foley Bros., Larsen & Co., on Wetaskiwin branch from Wetaskiwin, Alb., east to Battleford, 250 miles. Surveyed and 97 miles built last year. Sub-contract reported let to J. D. MacArthur, of Winnipeg.
——*Projected branch from Moose Jaw, Sask., northwest to Lacombe, Alb., 375 miles. Grading contract let to P. R. Lamb, of Winnipeg, for work from Moose Jaw north via Tuxford to point 30 miles beyond Rutland, 50 miles. Track being laid by the railroad and finished to Tuxford, 15 miles. Work also under way from Lacombe east 100 miles toward Moose Jaw. Surveyed, and 51 miles in operation to Stettler. Foley Bros., Larsen & Co., contractors.
——*Extension of the Pheasant Hills branch from Strassburg north via Saskatoon and Battleford to connection with the Wetaskiwin branch. Contract let to Foley Bros., Larsen & Co.; 15 miles built last year.
——*Building branch from Reston, Man., northwest to Wolseley, Sask., 122 miles; 98 miles built.
——*Building 37-mile extension of the Yorkton branch from Sheho, Sask., northwest toward Prince Albert.
——*Contract let to J. T. Hargrave, of Winnipeg, for grading 30 miles of branch from Stoughton west to Weyburn, Sask., 36 miles. Projected from Weyburn, Sask., west 100 miles to Range 30, west of the second meridian.
——Permission asked to build in Townships 6, 7, 8 or 9, Range 30 west of the second meridian, to connection with the Crows Nest Pass branch, between Range 16 west of the fourth meridian and Lethbridge, Alb., about 350 miles. Also from point on Crows Nest Pass branch in Township 10, Range 23 or 24 west of the fourth meridian north to Townships 15, 16, 17 or 18, Range 22, 23 or 24 west of the fourth meridian, 50 miles.
——Projected connecting line from Pheasant Hills branch southwest to Lacombe branch.
——Surveys being made for extension of the Esquimalt & Nanaimo. Work not yet authorized.
——*Extension of Kootenay Central from Golden, B. C., southeast to Fort Steel or Jaffray, about 180 miles. Contract for grading 10 miles from Golden south let to the British Columbia General Contract Co., of Vancouver. Track to be laid by the railroad.
——Permission asked to build branch from Earl Grey or Bulyea, Sask., on the Pheasant Hills branch southwest to Townships 20 or 21, Range 21 west of the second meridian.
——Proposed line through mineral district on Quebec side of Lake Temiskaming, with spur to Cobalt, Ont.

CANADIAN ROADS.—Harvey, McCarter & Pinkham, Revelstoke, B. C., are interested in a project to build from point on Arrow River, B. C., north to Yellow Head pass, 150 miles.
——Permission to build from northern boundary of British Columbia to Dawson City, Yukon, asked for by Henry Blitz and Louis Aurebach, of Boston, Mass.

CAPE BRETON.—Subsidy granted for extension from St. Peters, N. S., northeast to Lewisburg, 77 miles. G. E. Johnson, St. Peters, N. S., General Manager.

*CENTRAL ONTARIO.—Building extension from Bancroft, Ont., to Whitney, 43 miles. Contract from Maynorth to Whitney, 29 miles, let to Wm. G. Gibson, of Port Hope, Ont. Graded for 14½ miles, and track laid for four miles.

CHATHAM, WALLACEBURG & LAKE ERIE (Electric).—Proposed extension from Chatham, Ont., southeast to Rondeau Harbor, 20 miles. Surveys under way from Chatham north to Sarnia, 40 miles.

COBALT RANGE.—Surveys made from Haileybury, Ont., east to Lake Temiskaming, 90 miles, thence south to Ville Marie, and to connections with other roads. L. H. Timmons, Montreal, President.

CRAWFORD BAY & ST. MARY'S.—The Alberta Railway & Irrigation Co. to build from Lethbridge, Alb., east to Pakowki Lake, thence east through Alberta and Saskatchewan.

DAWSON, GRAND FORKS & STEWART RIVER.—This is the name of the construction company which is building the Klondike Mines, which see.

EASTERN RAILWAY.—To build along the east shore of Nova Scotia from Halifax to Guysboro, 220 miles; also branch from Stellarton to Country Harbor. C. J. Coll, of the Arcadia Coal Co., Stellarton, interested.

EDMONTON & ATHABASCA.—To build from Edmonton, Alb., north along the Athabasca river to Lac la Biche, 110 miles. Address T. J. Huggard, Winnipeg, Man.

EDMONTON, DUNVEGAN & BRITISH COLUMBIA.—Projected from Edmonton, Alb., to Fort George, B. C. Pringle & Guthrie, solicitors.

ERIE, LONDON & TILSONBURG (Electric).—To build from Port Burwell, Ont., northwest to London, 40 miles, with a branch east to Tilsonburg, 15 miles. Office at Tilsonburg, Ont. E. C. Jackson and E. V. Tillson, of Tilsonburg; J. H. Teall, Vienna; W. Warnock, Aylmer, and W. Thompson, London, incorporators.

ESQUIMALT & NANAIMO.—See Canadian Pacific.

FORDING VALLEY.—Authorized from Michel, B. C., to point on main line of Canadian Pacific, east of Calgary, Alb.; first building to be from Michel north to property of Imperial Coal & Coke Co., 30 miles. W. Herbert Evans, Montreal, President.

GEORGIAN BAY & SEABOARD.—See Canadian Pacific.

GRAND TRUNK.—The Kingston, Smith's Falls & Ottawa to build cut-off from Rideau six miles east of Kingston, Ont., north via Smith's Falls to point a few miles west of Ottawa, on the Canada Atlantic.
——Charter asked for line from Port Union, Ont., along Lake Ontario into Toronto, 20 miles.
——See Grand Trunk Pacific.

*GRAND TRUNK PACIFIC. — Projected from Moncton, N. B., across Canada to Prince Rupert, B. C., a new port on Kai En island, about 25 miles south of Port Simpson.
——*Moncton to Winnipeg, Man., 1,800 miles, called the National Transcontinental, to be built by the Canadian Government; $1,000,000 appropriated for rights of way and Quebec and Winnipeg terminals. Up to September 1, 1906, 9,156 miles of surveys made, of which 1,743 miles first location, 618 miles revised location and 358 miles final location. Contracts let as follows:
——*To Grand Trunk Pacific Ry., February 25, from Moncton, N. B., west to point near Chipman, 60 miles.
——*To Grand Trunk Pacific Ry., February 25, from Grand Falls, N. B., west to New Brunswick-Quebec line, 62 miles.
——*To Grand Trunk Pacific Ry., February 25, from New Brunswick-Quebec boundary west to Quebec bridge, 150 miles.
——*To Hogan & McDonald, Montreal, for 150 miles from north end of Quebec bridge, west to La Tuque. Over 6,000,000 yds. of earth and 1,000,000 yds. of rock excavation on this section, of which 600,000 yds. of earth and 300,000 yds. of rock finished. Sub-contract for 50 miles from Quebec bridge west let to M. T. Davis, Ottawa. Work under way on Cape Rouge viaduct, 3,000 ft. long.
——*To M. T. & J. T. Davis, Ottawa, February 25, from La Tuque, Que., west to Weymontachene, 45 miles.
——*To Lyons & White, Ottawa, February 25, from point eight miles west of Abitibi river, east 150 miles.
——*To J. D. MacArthur, Winnipeg, from junction of Lake Superior branch west to point a few miles east of Winnipeg, 244 miles. Subcontracts let to A. Herbert, 20 miles; W. Wardrup, 15 miles; F. W. Smith, 2 miles of rock work; Guy Campbell, Ottawa, rock work, and W. T. Parsons, of Kenora, Ont., 15 miles, including about 1,000,000 yds. of rock excavation. Excavation on this section amounts to over 11,000,000 yds. of earth and 3,500,000 yds. of rock, of which 280,000 yds. of earth and 180,000 yds. of rock finished.
——*Lake Superior branch, from Lake Superior Junction southeast to Fort William, 210 miles, under contract to Foley Bros., Larsen & Co. Work under way.
——*The western line, Winnipeg, Man., via Saskatoon, Sask., Edmonton, Alb., and Yellow Head pass to Prince Rupert, 1,750 miles, to be built by Grand Trunk Pacific. Preliminary surveys from Winnipeg to junction of Salmon and Fraser rivers, 1,247 miles, of which Winnipeg to Edmonton, 776 miles, approved by Canadian Government.
——*Contract let to MacDonald-McMillan Construction Co., Winnipeg, from Winnipeg west to Portage la Prairie, 56 miles. Work under way.
——*Contract let to MacDonald-McMillan Construction Co., Winnipeg, for grading from Portage la Prairie, Man., west to Touchwood Hills, Sask., 275 miles.
——*Contract let to Canadian White Co. (J. G. White & Co.), Montreal, from Touchwood Hills to Saskatoon, Sask., 140 miles. Sub-contracts let to M. C. Cance Rainy River, Ont.; J. H. Armstrong and S. D. Lake.
——*Contract let to Foley Bros., Larsen & Co., St. Paul, Minn., from Saskatoon to Edmonton, Alb., 318 miles. Sub-contracts let to Cash Bros. for work in Alberta near Battle river.
——*Construction work begun on Kai En island.
——The Grand Trunk Pacific Branch Lines Co. authorized to build branches as follows:
——From Moncton, N. B., to Halifax; to St. Johns, N. B.; to Montreal; to Ottawa; to North Bay, Ont.; from main line northeast of Fort William, Ont. southeast to Grand Trunk north of Toronto; to Sudbury, Ont.; from Sudbury to Kashabowie, Ont., 960 miles, located; from Sudbury to Batchawaung bay, on Lake Superior, 170 miles, located; from Rumford, on the Canadian Pacific west of Sudbury, to projected James bay line; to Sault Ste. Marie.
——From main line of Grand Trunk Pacific at Winnipeg to the boundaries of Manitoba; to Brandon; to international boundary; to Calgary, Alb.; Yorktown, Sask.; Regina, Sask.; Prince Albert, Sask.; Battleford, Sask.; Dawson City, Yukon, and Hudson Bay; from Calgary to international boundary; from Prince Rupert south to Vancouver; from north shore of Vancouver Island southeast along the west side of the island to Victoria.

GREAT NORTHERN.—See Great Northern under United States.

HAMILTON, WATERLOO & GUELPH (Electric).—To build from Hamilton, Ont., west to Galt; also from Hamilton northwest to Guelph, 60 miles. Address Thomas E. Hillman, Hamilton Provident Loan Bldg., Hamilton, Ont.

HILLCREST RAILWAY, COAL & COKE.—Organized to build from Morrisey, B. C., to Hillcrest Junction and Cardston, Alb., with branches to Pincher Creek and to coal and oil fields.

*INTERCOLONIAL.—Contract let to Willard Kitchen, of Fredericton, N. B., for the Colton Factory Branch from Richmond, N. S., to Kempt Road, Halifax, two miles. Grading to be begun in April.

——Proposed second double track between St. John, N. B., and Hampton, 22 miles, and between Moncton and Painsee Junction, seven miles.

INTERNATIONAL OF NEW BRUNSWICK.—Projected from Campbellton, N. B., to St. Leonards on St. John river, 110 miles; 33 miles built by Thos. Malcolm, contractor. Contracts for 60 miles to be let this month.

KAMLOOPS & YELLOW HEAD PASS.—Chartered to build between Kamloops north to Tete Jaune Junction Cache, B. C., 250 miles.

KAMLOOPS, BOUNDARY & CARIBOO.—To build from Grand Forks, B. C., north and northwest to Grand Prairie. Pringle & Guthrie, Ottawa, may be addressed.

*KETTLE VALLEY LINES.—Contract reported let to P. Tierney, Nelson, B. C., for 60-mile extension from Grand Forks, B. C., west; also to Lewis Woodward, of Grand Forks, for 16 miles.

——Survey for extension from Republic, Wash., southeast to Spokane, 145 miles.

KINGSTON, SMITH'S FALLS & OTTAWA.—See Grand Trunk.

*KLONDIKE MINES.—Granted concession to build about 80 miles from Dawson City, Yukon, to the Stewart river. Contract let to Dawson, Grand Forks & Stewart River Railroad Corporation. Sub-contract let to O'Brien & Mackenzie, of Dawson City. Partly built. A 55-mile extension from Sulphur Springs to be built this year. J. A. C. Seybold, President, and H. Blackfield Smith, Chief Engineer, Ottawa, Can.

KOOTENAY CENTRAL.—See Canadian Pacific.

LOTBINIERE & MEGANTIC.—Projected extension from Lyster, Que., to Lime Ridge, 60 miles.

MANITOBA RADIAL.—Projected from Winnipeg northwest to Lake Manitoba. Arthur Wagner, Ottawa, interested.

NEW BRUNSWICK ROADS (Electric).—Projected line from St. Johns, N. B., to Grand Forks, 130 miles. James Burgess and J. F. Tweedie, Victoria County, N. B., interested.

*NIAGARA, ST. CATHERINES & TORONTO.—Contract let to Joseph Battle, Thorold, Ont., for extension from Fonthill, Ont., to Welland, five miles.

——Surveys being made from St. Catherines, Ont., to Niagara-on-the-Lake, 12 miles.

NORTHEASTERN RAILWAY.—To build the following lines:

——From point near Ville Marie, Ont., on Lake Temiskaming, east, south of Lakes des Quinze, Victoria and Kakebonga, to Quebec.

——From Lake Temiskaming to the National Transcontinental near Lake Abitibi.

——From near Lake Kakebonga to Maniwaki.

——From near the Gatineau river to Nomingue.

J. C. Heintz, P. Harnischfyer, New York; J. T. Marchand, J. B. Lapointe, Montreal, and R. Chevrier, Ottawa, incorporators.

NOVA SCOTIA EASTERN.—New syndicate to build from Halifax to Guysboro, with a branch line to New Glasgow. Sir Montague Allan, of Montreal, interested.

ORFORD MOUNTAIN.—Runs from Mansonville, Que., to Windsor Mills. Projected extensions from Windsor Mills south to Bromptonville, eight miles, and from Mansonville, south to North Troy, Vt., four miles.

——Application made for more time to finish extension of the Bolton branch 10 miles. Grading completed six miles.

PACIFIC & EASTERN.—Projected from Victoria, B. C., northeast via Edmonton and Prince Albert to Hudson Bay. Sir Henry Pellatt, of Toronto, interested.

PONTIAC CENTRAL.—Projected from Bryson, Que., to point on James Bay, Ontario. Ryan & Bickerdyke, Montreal, applicants.

*PRINCE ALBERT & NORTHERN SASKATCHEWAN.—Reported building from Prince Albert, Sask., northeast to Hudson's Bay. Office at Prince Albert.

QUEBEC & JAMES BAY.—See Quebec & Lake St. John.

*QUEBEC & LAKE ST. JOHN.—Building branch from La Tuque Junction, Que., to La Tuque Falls, 40 miles. Graded 35 miles; track laid 30 miles. Joseph Paquet, Levis, Que., contractor.

——*Contracts let to Edward Conway, Quebec, for building the Gosford branch, from Valcartier Station, Que., to Riviere aux Pius, six miles. Track laid for five miles.

——Surveys made for the Quebec & James Bay from Roberval, Que., to Chute a L'Ours, 30 miles.

QUEBEC MIDLAND.—Organized to build from Quebec-Ontario boundary line to the west shore of Lake Mattagami, Que. Office at Ottawa. A. Wilson, R. B. Owens, H. Mitchell and J. E. Hurdman, of Montreal, and F. H. Chrysler, Ottawa, Directors.

QUEBEC, MONTREAL & SOUTHERN.—See Delaware & Hudson, under United States.

REGINA & HUDSON BAY.—Proposed line from international boundary between second and third meridians, via Regina, Sask., to Fort Churchill, Keewatin. Incor. McGiverin & Hayden, Ottawa, Ont., solicitors.

ST. LEON.—Organized to build from St. Leon, Que., north to St. Elie, 20 miles, with branches east to Three Rivers and west to Lake Maskinonge, together 40 miles. Office at Louisville, Que.

ST. MARY'S & WESTERN ONTARIO.—Bids asked, last month for clearing right of way, grading, track-laying, bridging, ballasting, fencing and telegraph lines complete for a section of this line between St. Mary's and Embro, Ont. J. G. Macklin, Chief Engineer, St. Mary's, Ont.

SASKATCHEWAN & ALBERTA.—Organized to build from Moose Jaw, Assin., south to international boundary, 100 miles, with a branch west to Swift Current, 100 miles. Charles E. Armstrong, Calgary, Alb., solicitor.

SASKATCHEWAN VALLEY & HUDSON'S BAY.—Projected from Edmonton, Alb., to Prince Albert, and thence to Fort Churchill on Hudson's Bay, 1,500 miles. G. E. McCraney, Ottawa, is interested.

SHERBROOKE & QUEBEC.—Projected from Sherbrooke, Que., to the Quebec bridge, 110 miles. F. N. McCrea and E. W. Tobin, Sherbrooke, Que., applicants.

*TEMISKAMING & NORTHERN ONTARIO.—Building extension from McDougall's Chute, Ont., 54 miles north of Englehart, north to junction with the projected Grand Trunk Pacific, 112 miles north of Englehart. Contracts let to A. R. McDonnell, of New Liskeard, for first seven miles, and to McRae, Chandler & McNeil, of Quebec, for remaining 51 miles.

——Contracts for clearing and grading branches let as follows:

——*Charlton branch, Englehart to Charlton, eight miles, to the Canadian Construction Co., of Montreal.

——*Kerr Lake branch, Cobalt to Kerr Lake, four miles, to A. Spencer, of Niagara Falls.

——*Haileyburg Spur, Haileyburg wharf to main line, 1.75 miles, to McQuigg & Hunt, of Arnprior, Ont.

TORONTO, NIAGARA & WESTERN.—Planning to build a high speed electric line from Niagara Falls, Ont., to Toronto, 90 miles.

VANCOUVER, VICTORIA & EASTERN.—See Great Northern, under United States.

WINNIPEG & LAKES (Electric).—More time allowed to build lines from Winnipeg to Lake Manitoba, Lake Winnipeg and Portage la Prairie, Man. T. G. Haig, Winnipeg, promoter.

WINNIPEG & NORTHWESTERN.—Projected from Winnipeg, Man., north via Lake Manitoba to Lopstick river, Sask. A. T. Drummond, Toronto, solicitor.

WOLFE, MEGANTIC & LOTBINIERE.—Chartered to build from Lime Ridge, Wolfe County, Que., north to Quebec, 100 miles. Right of way secured. W. H. Lamby, Inverness, Que., Secretary.

Mexico.

CANANEA, YAQUI RIVER & PACIFIC.—See Southern Pacific under United States.

COAHUILA COAL.—Surveys made for extension from Muzquiz, Puebla, to Paredon, about 143 miles. (Mar. 16, 1906.)

HIDALGO & NORTHEASTERN.—Surveys for extension from Pachuca, Hidalgo, to Tuxpan.

*INTEROCEANIC OF MEXICO.—The Teziutlan branch being extended from Teziutlan, Puebla, east to port of Nautla, about midway between Vera Cruz and Tuxpan.

——Line from Mexico City east to Vera Cruz, 350 miles. Final surveys made.

*KANSAS CITY, MEXICO & ORIENT.—See under United States.

*LA DICHA & PACIFIC.—Building from La Dicha, Guerrero, west to Port San Marquez, 12 miles south of Acapulco, on the Pacific coast of Guerrero, 75 miles. Office at La Dicha. The Mitchell Mining Co. owns the road. Several miles graded.

LINARES & SAN CARLOS.—Projected extension from San Carlos, Tamaulipas, probably to the port of Barra de Soto la Marina.

*MEXICAN CENTRAL.—Building Manzanillo extension from Tuxpan, Jalisco, to Colima, capital of Colima, 45 miles. Hampson & Smith, Mexico City, contractors. Number of important bridges and 12 tunnels. Some heavy work to be done between Colima and the port of Manzanillo. Connection at Colima with Mexican National Construction Co.'s Railroad.

——Large terminal to be built at Manzanillo. About 1,000 acres of land bought.

——Projected cut-off from Apulco, Hidalgo, north 130 miles, to Tamos on the San Luis division, to give a more direct connection between Mexico City and Tampico.

——Authorized to build branch from Zacatepec, on Cuernavaca division, to Jojutla and Tlaltenango, Morelos; also other short branches. All to be finished within three years.

——Proposed line from Guanajuato, Guanajuato, to Marfil.

MEXICAN INTERNATIONAL.—About 24 miles of second track to be laid from Adjuntas, Coahuila, south to Castano.

——Proposed extension from Durango, Mex., to Guadalajara, about 400 miles. Located from Durango to Chalchihuites, 150 miles.

——Extension from Durango southwest across the Sierra Madres to port of Mazatlan, state of Sinaloa, on Pacific coast, 225 miles. Surveys approved by Mexican Government, but construction not yet authorized.

——Extension of Papasquiaro line to mining camp of Guanacevi, Durango. Projected.

——Proposed branch from Allende to the Rio Grande river, opposite Delrio, Tex. Final surveys.

MEXICAN PACIFIC.—Surveys made from Jalisco, Chiapas, northeast to Campeche. Pedro A. Gonzalez, Chief Engineer; J. M. Keeland, promoter.

MEXICAN ROADS.—Concessions granted to A. S. Mackenzie to build from Carbo, on Sonora Ry., to Copeta, Sonora. To be completed in five years. Headquarters at Hermosillo, Mexico.

——*Mexican Coal & Coke Co., proposed extension from mines at Las Esperanzas, Coahuila, to Nogalitas, 24 miles, eventually to Monterey, 150 miles further. Surveys finished. Hampson & Smith, City of Mexico, contractors. G. A. Stranahan, Engineer in Charge. (Mar. 16, 1906.)

——Vice-Consul J. H. Brickwood, of Nogales, reports road projected from Port Lobos, on Sonora side Gulf of California, northeast to Caborca, 50 miles. Concessions obtained by John Henderson. After surveys, decided to extend 150 miles farther to Tucson, Ariz., crossing boundary line near junction of Altar and Magdalena districts.

——Concession granted to Ricardo Crombe for line from Culiacan, Sinaloa, to Tepehuanes, Durango, 100 miles.

——Company being organized to carry out the concession granted to Gualterio C. Palmer, of Zacatecas, to build from Gutierrez, Zacatecas, west via Sombrerete and Chaichihuites to Durango, 190 miles.

——Andres Bermejillo & Co., of Mexico City, planning to build in Guanajuato and Michoacan. Concession granted.

——Projected line from Temosachic, Chihuahua, to timber lands of the Sierra Madre Land & Lumber Co. Col. W. C. Greene interested.

——An English syndicate reported planning to build from San Jose del Sitio, Chihuahua, south to Parral and north to the Kansas City, Mexico & Orient.

——Concession granted to John Lureno Gonzalez Trevenine, of Monterey, to build from Garza Galan, Coahuila, to Allende, 75 miles. (Mar. 16, 1906.)

——William Niven, Balsas, Guerrero, organizing company to build from Balsas down the Balsas river to Cayuca de Catalan, 100 miles. (Mar. 16, 1906.)

MEXICO, OAXACA & YUCATAN. — Projected from Mexico City southeast via Oaxaca and Santa Lucretia to Merida, the capital of Yucatan, 1,300 miles. Preliminary surveys made and construction to begin soon. Branch projected from Concepcion, Oaxaca, southeast to port of Belize, in British Honduras. W. G. Seaver, President; W. S. Carter, St. Louis, and W. J. Allen, Vice-Presidents; R. E. Briggs, formerly on the Mexican Central, Chief Engineer; Santiago Mendez, Inspector General of National Lines of Mexico, Consulting Engineer; R. C. Fraser, 10 Wall street, New York, Secretary and Purchasing Agent.

*MONCLOVA & PANUCA.—Work reported begun on this road from Monclova, Coahuila, south to Panuca, 50 miles.

*MORELIA & TACAMBARO.—Building from Irapuato, Guanajuato, south via Piruandiro, Michoacan, Morelia and Tacambaro, to Ario, 225 miles. Concessions granted. Contract for the first section of 50 miles has been let to Hampson & Smith, of Mexico City; nearly finished. Edson J. Chamberlin, formerly General Manager of the Canada Atlantic, President; Gilbert E. Fauquier, of the Pacific Construction Co., Ottawa, Vice-President and General Manager. Jacob L. Greatsinger, former president of the Brooklyn Rapid Transit Co., and Albert J. Peyton, of A. J. Peyton & Co., of New York, interested.

NATIONAL OF MEXICO.—Planning to make standard gage the old line from Gonzalez Junction to Mexico City, 231 miles.

——Surveys from San Felipe on the main line to Guadalajara; also from Salamanca on the Jaral branch to Guadalajara.

ORIZABA RAILWAY.—To build from Orizaba, Vera Cruz, east to Vera Cruz, with branches, 20 miles. Offices at Mexico City, Orizaba and Guthrie, Okla. H. W. Pentecost and C. B. McKennon, incorporators.

*PAN-AMERICAN.—Contract let to R. T. Davis, from Tonala, Mex., to the Guatamala line, 100 miles; 35 miles graded and 50 miles cleared.

*PARRAL & DURANGO.—Contracts let to Dudley & Co., Parral, Chihuahua, for extension from Mesa de Sandia, Durango, south, 12½ miles.

*RIO GRANDE, SIERRA MADRE & PACIFIC.—Work under way on extension from Nueva Casas Grandes, Chihuahua, building under the name of the Sierra Madre & Pacific, to Temosachic, 150 miles.

ST. LOUIS, BROWNSVILLE & MEXICO. — See United States.

SAN GREGORIO.—The Dwight Furness Co., of Guanajuato, Guanajuato, has bought this road, and will extend it from Marfil, Guanajuato, to Irapuato. Now in operation to the San Gregorio mines. Dwight Furness, of Guanajuato, President.

*SAN JUAN DE OAXACA.—Building from San Pablo Zimatlan, Oaxaca, to Taviche, 17 miles. All but two miles finished. Houston & Buckner, Oaxaca, contractors. William Waters, Ocotlan, Chief Engineer.

SIERRA MADRE & PACIFIC.—See Rio Grande, Sierra Madre & Pacific.

SONORA RAILWAY.—See Southern Pacific under United States.

TEHUANTEPEC NATIONAL.—Concession granted to S. Pearson & Son, Ltd., of London, for branch to Minatitlan, 10 miles.